# **FINAL**

# **ENVIRONMENTAL ASSESSMENT**

of the

FINAL RULE

amending the

**ATLANTIC LARGE WHALE** 

TAKE REDUCTION PLAN

DYNAMIC AREA MANAGEMENT

Gear Modifications

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National Marine Fisheries Service
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#### 1.0 INTRODUCTION

Pursuant to Section 118 of the Marine Mammal Protection Act (MMPA), the National Marine Fisheries Service (NMFS) established the Atlantic Large Whale Take Reduction Team (ALWTRT or Team) to develop a plan for reducing the incidental by-catch of three endangered species of large whale - the North Atlantic right whale (<u>Eubalaena glacialis</u>), humpback whale (Megaptera novaeangliea), fin whale (Balaenoptera physalus) - in four commercial fisheries along the Atlantic coast. The Team consists of representatives from the fishing industry, fishery management councils, state and federal resource management agencies, the scientific community, and conservation organizations. The immediate goal of the Team was to draft an Atlantic Large Whale Take Reduction Plan (Plan) to reduce the incidental take of these three large whale species that interact with commercial fisheries to a level less than the potential biological removal level (PBR) within six months of implementation of the Team's plan. The measures proposed under the Plan would also benefit minke whales (Balaenoptera acutorostrata), which are neither listed under the Endangered Species Act (ESA) nor designated as a strategic stock under the MMPA.

Following the ALWTRT's initial set of meetings, NMFS developed a proposed Plan published on July 22, 1997 (62 FR 16519), which was later modified and finalized on February 16, 1999 (64 FR 7529). Additional gear modifications were published as an interim final rule in December 2000 (65 FR 80368) and a final rule in January 2002 (67 FR 1300, January 10, 2002; 67 FR 15493, April 2, 2002). NMFS also published an interim final rule for a Seasonal Area Management (SAM) program (67 FR 1142, January 9, 2002; 67 FR 65722, October 28, 2002) and a final rule for a Dynamic Area Management (DAM) program in January 2002 (67 FR 1133, January 9, 2002; 67 FR 65722, October 28, 2002). The main tools of the plan include a combination of broad gear modifications and time-area closures (which are being supplemented by progressive gear research), expanded disentanglement efforts, extensive outreach efforts in key areas, and an expanded right whale surveillance program to supplement the Mandatory Ship Reporting System.

# 2.0 PURPOSE AND NEED

The purpose of this document is to examine the impacts to the environment that would result from allowing lobster trap and anchored gillnet gear with certain modifications designed to reduce the risk of entanglement to North Atlantic right whales (right whales) in a Dynamic Area Management (DAM) zone under the DAM program. Although the DAM program envisioned allowing gear with certain modifications in a DAM zone as one management option, NMFS had not yet identified and analyzed gear modifications that sufficiently reduce the risk of

<sup>&</sup>lt;sup>1</sup> These fisheries include the New England Multispecies sink gillnet fishery, the Gulf of Maine/U.S. Mid-Atlantic lobster trap/pot fishery, the U.S. Mid-Atlantic coastal gillnet fishery, and the Southeastern U.S. Atlantic shark gillnet fishery.

entanglement as part of that rulemaking. As a result, the only options currently available to NMFS for protecting right whales inside a DAM zone are total closures or an alert requesting the voluntary removal of all gear. The final rule will provide a description of the modifications to lobster trap/pot and anchored gillnet gear that the Assistant Administrator (AA) may impose inside a DAM zone as one option to reduce the risk to right whales. Actual restrictions would be imposed on an event-by-event basis in a separate notice delineating the DAM zone and describing the restrictions.

The need for this protective measure is also driven by the goals of the MMPA and ESA. Under the 1994 Amendments to the MMPA, the goal of a Take Reduction Plan is to reduce the incidental take of strategic stocks of marine mammals in commercial fishing operations to below PBR within 6 months of Plan implementation and to insignificant levels approaching a zero mortality and serious injury rate (zero mortality rate goal (ZMRG)) within 5 years of Plan implementation. For right whales these two goals are essentially the same as PBR has been defined as zero. Under the ESA, NMFS is obligated to use its authorities to conserve endangered and threatened species and ensure that actions authorized by the agency, such as fishing in federal waters, are not likely to jeopardize the continued existence of any endangered or threatened species, including right whales. Although there is not consensus on the details of implementation, the Team, states, and NMFS have all identified gear modifications within Dynamic Area Management (DAM) zones as an appropriate tool in the risk reduction strategy.

### 2.1 BACKGROUND

The complete background for the ALWTRP is found in Section 2.1 of the Environmental Assessment published on July 15, 1997 (NMFS 1997). The following background section is in reference to the specific actions to implement Dynamic Area Management to protect right whales.

The February 1999 final rule implements the regulatory tools of the ALWTRP which included a combination of broad gear modifications and time-area closures. The ALWTRP is supplemented by a non-regulatory component, which includes progressive gear research, expanded disentanglement efforts, extensive outreach efforts in key areas, and an increased right whale surveillance program to complement the Mandatory Ship Reporting System.

The Team met on February 22-24, 2000, to determine how to adjust the current Plan to further reduce the possibility of entanglement of large whales, primarily the right whale, in lobster trap and anchored gillnet gear. The Team was informed of the sense of urgency in this task given the continued entanglement of right whales in the face of clear evidence that the population is declining. There was a general understanding from available entanglement data that right whales may encounter fixed gear anywhere. Therefore, to supplement the existing time-area closures being implemented in right whale critical habitat, the Team looked for measures that could be broadly applied throughout

the range of the species. Following discussion on various alternative actions, the Team recommended that the existing requirement for fishermen to use gear modifications from the Lobster and Gillnet Gear Technology Lists, in certain areas, be replaced with specific gear modifications. Data from the last three years of NMFS gear research demonstrated that mandatory gear modifications are cost effective, operationally acceptable to the fishermen, and have a reasonable chance of providing additional entanglement risk reduction for large whales. The Team agreed that the likelihood of right whale movements through State waters was low enough to not require additional regulations within State waters at this time. On December 21, 2000 (65 FR 80368), an interim final rule was published which incorporated the Team's recommendations. The modifications contained in the interim final rule only applied to the New England anchored gillnet and lobster trap fisheries and the Mid-Atlantic lobster trap fishery. These requirements became effective on February 21, 2001.

The December 2000 interim final rule modifies the February 1999 final rule by changing gear requirements for the lobster trap fisheries in the Northeast and Mid-Atlantic and anchored gillnet fisheries in the Northeast segment of the ALWTRP. Components of the December 2000 interim final rule include the following:

- Nearshore and Offshore Lobster Waters were redefined to be consistent with the American Lobster Fisheries Area designations (Areas 1 through 5, and the Outer Cape Management Area);
- The following new gear requirements were imposed for lobster fisheries in the Offshore Lobster Waters (Area 3 and the Area 2/3 overlap):
  - Knotless weak links at the buoy with a breaking strength of 3,780 lb or less
  - Gear marking midway on the buoy line
- The following new gear requirements were imposed for lobster fisheries in the Northern Nearshore Lobster Waters (Areas 1,2, and the Outer Cape Management Area):
  - Knotless weak links at the buoy with a breaking strength of 600 lb or less
  - Multiple trap trawls only single trap trawls were not allowed
  - Limit of one buoy line on all trawls up to and including 5 traps
  - Gear marking midway on the buoy line
- The following gear requirements were imposed for the lobster trap fishery in the Southern Nearshore Lobster Waters (Areas 4 and 5)
  - Gear marking midway on the buoy line
- The gear technology list was eliminated for the sink gillnet fisheries in the Northeast gillnet waters (East of 72°30'W Long.). The gear requirements imposed were:
  - Knotless weak link at the buoy with a breaking strength no greater than 1,100 lb.

- Weak link placed in the headrope (floatline) at the center of each net panel
- Net strings that contain 20 net panels or less must be anchored with one of three optional anchoring systems
- Gear marking midway on the buoy line
- The Lobster Gear Technology list was changed to reduce the breaking strength for the buoy weak link option to 600 lb or less and require it to be knotless.

Pursuant to Section 7 of the ESA, in 2001, NMFS reviewed the effect of fishery management activities on species listed as threatened or endangered. On June 14, 2001, NMFS issued biological opinions (BOs) for the monkfish, spiny dogfish, and multispecies Fishery Management Plans (FMP) and Federal regulations for the lobster fishery. The BOs concluded that the fishery management actions, as proposed, had the potential to jeopardize the continued existence of right whales. A reasonable and prudent alternative (RPA) was included in the BOs, which contains a number of measures necessary to avoid jeopardy. Components of the RPA included expanded gear modifications, Seasonal Area Management (SAM), and Dynamic Area Management (DAM).

In 2002, NMFS published four rules, which included: 1) final rules (67 FR 1300, Janaury 10, 2002; 67 FR 59471, September 23, 2002) implementing ALWTRT recommended gear modifications to the ALWTRP, as well as those modifications determined by NMFS as necessary for lobster trap gear in the Offshore Lobster Waters, Southern Nearshore Lobster Waters, anchored gillnet gear in Mid-Atlantic Coastal Waters, changes to the lobster trap and anchored gillnet take reduction technology lists, and modifications to the southeast Atlantic gillnet fishery; 2) an interim final rule (67 FR 1142, January 9, 2002) implementing the SAM program that defined two areas based on the annual predictable presence of right whales in which gear restrictions for lobster trap and anchored gillnet gear are required; and 3) a final rule (67 FR 1133, January 9, 2002) implementing the DAM program that protects unexpected aggregations of right whales by temporarily restricting lobster trap and anchored gillnet fishing.

The DAM program, which is the subject of this rulemaking, establishes criteria and procedures to temporarily restrict lobster trap and anchored gillnet gear on an expedited basis within defined areas (i.e. DAM zones) north of 40° N. latitude in order to further reduce the risk of entanglement to right whales from these gear types. Under the DAM program, once a DAM zone is identified, NMFS may: 1) require the removal of all lobster trap and anchored gillnet fishing gear for a 15-day period; 2) allow modified lobster trap and anchored gillnet fishing gear within a DAM zone for a 15-day period; and/or 3) issue an alert to fishermen requesting the voluntary removal of all lobster trap and anchored gillnet gear for a 15-day period, and asking fishermen not to set any additional gear in the DAM zone during the 15-day period. More details on the DAM program, in general, are provided in the Environmental Assessment published on December 27,

2001 (NMFS, 2001) which is available from NMFS and on the ALWTRP internet web page: http://www.nero.nmfs.gov/whaletrp/.

The first DAM action in 2002 was triggered on April 14, 2002, when the NMFS aerial survey team spotted eight right whales approximately 30 nm east of Cape Ann, Massachusetts in an area called Wildcat Knoll. On April 26, 2002, NMFS published a notice (67 FR 20699) in the Federal Register to announce temporary area and gear restrictions to protect this aggregation right whales off Cape Ann, Massachusetts for 15 days. The restrictions applied to lobster trap and anchored gillnet gear in an area totaling approximately 1,100 nm² in April and 1,700 nm² in May and became effective April 29, 2002. All lobster trap and anchored gillnet fishermen fishing in this area were required to remove all gear by the effective date and could not set any additional gear in the DAM zone during the restricted period. This DAM zone terminated automatically at the end of the restricted period.

The second DAM action in 2002 was triggered on June 18, 2002, when the NMFS aerial survey team spotted seventy-five right whales east of Cape Cod, Massachusetts in an area called the Great South Channel. On July 1, 2002, NMFS published a notice (67 FR 44092) in the Federal Register to announce mandatory and voluntary measures off Cape Ann, Massachusetts for 15 days. The measures applied to lobster trap and anchored gillnet gear in an area totaling approximately 3,500 nm² and became effective July 1, 2002. All lobster trap and anchored gillnet fishermen fishing in the mandatory area were required to remove all gear by the effective date and could not set any additional gear in the DAM zone during the restricted period. All lobster trap and anchored gillnet fishermen fishing in the voluntary area were urged to remove all gear by the effective date and not set any additional gear in the DAM zone during the restricted period. This DAM zone terminated automatically at the end of the restricted period.

A third DAM action was triggered on November 20, 2002, when the NMFS aerial survey team reported eight right whales east of Portsmouth, New Hampshire, in an area called Jeffreys Ledge. On December 3, 2002, NMFS published a temporary rule (67 FR 71900) in the <a href="Federal">Federal</a> Register to announce mandatory restrictions in the DAM zone for a 15-day period. The measures applied to lobster trap and anchored gillnet gear in an area totaling approximately 1,600 nm<sup>2</sup> and became effective December 5, 2002. All lobster trap and anchored gillnet fishermen in the DAM zone were initially required to remove all gear by the effective date and could not set any additional gear in the DAM zone during the restricted period. However, following the publication of the temporary rule, an unforseen adverse weather pattern developed, which led NMFS to rescind the mandatory restrictions and replace them with voluntary measures in the DAM zone for the restricted period. As a result, weather permitting, all lobster trap and anchored gillnet fishermen fishing in the DAM zone were encouraged to remove all gear and not set any additional gear in the DAM zone during the restricted period. This DAM zone terminated automatically at the end of the restricted period.

The fourth, and final, DAM of 2002 was triggered on December 19, 2002, when the NMFS aerial survey team spotted four right whales in an area east of Cape Ann, Massachusetts, known as Cashes Ledge. On December 30, 2002, NMFS published a notice (67 FR 79536) in the Federal Register to announce voluntary restrictions in the DAM zone for a 15-day period. The voluntary measures applied to lobster trap and anchored gillnet gear in an area totaling approximately 1,460 nm² and became effective December 24, 2002. Voluntary measures were implemented in this DAM zone due to poor weather and in consideration of the safety of life at sea. Therefore, weather permitting, lobster trap and anchored gillnet fishermen fishing in the DAM zone were encouraged to remove all gear and not set any additional gear in the DAM zone during the restricted period. This DAM zone terminated automatically at the end of the restricted period.

The first DAM action in 2003 was triggered on March 23, 2003, when the NMFS aerial survey team spotted 42 right whales east of Cape Cod, Massachusetts. On April 15, 2003, NMFS published a notice (68 FR 18143) in the <u>Federal Register</u> to request the voluntary removal of gear from the DAM zone for a 15-day period. The voluntary measures applied to lobster trap and anchored gillnet gear in an area totaling approximately 1,800 nm² and became effective on April 10, 2003. All lobster trap and anchored gillnet fishermen fishing in this area were encouraged to remove all gear from the DAM zone and were asked not to set any additional gear in the DAM zone during the restricted period. This DAM zone terminated automatically at the end of the restricted period.

The second DAM action in 2003 was triggered on May 18, 2003, when the NMFS aerial survey team spotted 3 right whales northeast of Cape Cod, Massachusetts, in an area called Wilkinson Basin. On June 4, 2003, NMFS published a notice (68 FR 33474) in the Federal Register to request the voluntary removal of gear from the DAM zone for a 15-day period. The voluntary measures applied to lobster trap and anchored gillnet gear in an area totaling approximately 925 nm² and became effective on May 29. All lobster trap and anchored gillnet fishermen fishing in this area were encouraged to remove all gear from the DAM zone and were asked not to set any additional gear in the DAM zone during the restricted period. This DAM zone terminated automatically at the end of the restricted period.

The third DAM action in 2003 was triggered on May 30, 2003, when the NMFS aerial survey team spotted 5 right whales east of Cape Ann, Massachusetts, in an area called Cashes Ledge. On June 13, 2003, NMFS published a notice (68 FR 35386) in the Federal Register to request the voluntary removal of gear from the DAM zone for a 15-day period. The voluntary measures applied to lobster trap and anchored gillnet gear in an area totaling approximately 1,265 nm² and became effective on June 10. All lobster trap and anchored gillnet fishermen fishing in this area were encouraged to remove all gear from the DAM zone and were asked not to set any additional gear in the DAM zone during the restricted period.

### 3.0 ALTERNATIVES

#### 3.1 NON PREFERRED ALTERNATIVE 1

This alternative would amend the regulations implementing the DAM program by identifying gear modifications for fishing inside a DAM zone. However, this alternative contains some different gear modifications than those described in Section 3.3. The gear modifications under this alternative would be based on those currently in use under the Seasonal Area Management (SAM) program. The current SAM gear modifications are as follows:

# Lobster Trap Gear

Fishermen utilizing lobster trap gear within the portion of the Northern Nearshore Lobster Waters, Southern Nearshore Lobster Waters, Northern Inshore State Lobster Waters, Cape Cod Bay Restricted Area (May 16 through December 31), and Stellwagen Bank/Jeffreys Ledge Restricted Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines and buoy lines must be made entirely of either sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;
- Fishermen utilizing lobster trap gear within the DAM areas must utilize no more than one buoy line per trawl string.

  This buoy line must be at the northern or western end of the trawl string depending on the direction of the set; and
- A weak link must be placed at all buoys with a maximum breaking strength of 600 lb.

Fishermen utilizing lobster trap gear within the portion of the Great South Channel Restricted Lobster Area (July 1 through March 31) and Offshore Lobster Waters Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines and buoy lines must be made of either sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;
- A weak link must be placed at all buoys with a maximum breaking strength of 1,500 lb; and
- Fishermen utilizing lobster trap gear within the DAM areas must utilize no more than one buoy line per trawl string. This buoy line must be at the northern or western end of the trawl string depending on the direction of the set.

### Anchored Gillnet Gear

Fishermen utilizing anchored gillnet gear within the portion of the Other Northeast Gillnet Waters, Cape Cod Bay Restricted Area (May 16 through December 31), Stellwagen Bank/Jeffreys Ledge Restricted Area, Great South Channel Restricted Gillnet Area (July 1 through March 31), Great South Channel Sliver Restricted Area (July 1 through March 31), and Mid-Atlantic Coastal Waters that overlap with a DAM zone may be

required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines and buoy lines must be made of sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;
- Each net panel must have a total of 5 weak links with a maximum breaking strength of 1,100 lb each. Net panels are typically 50 fathoms in length, but the weak link requirements would apply to all variations in panel size. These weak links must include 3 floatline weak links. The placement of the weak links on the floatline must be, one at the center of the net panel and one each as close as possible to each of the bridle ends of the net panel. The remaining 2 weak links must be placed in the center of each of the up and down lines at the panel ends;
- Fishermen utilizing gillnets within the DAM areas must utilize no more than one buoy line per net string. This buoy line must be at the northern or western end of the gillnet string depending on the direction of the set; and
- All anchored gillnets, regardless of the number of net panels, must be securely anchored with the holding power of at least a 22 lb Danforth style anchor at each end of the net string.

### 3.2 NO ACTION

The No Action alternative would leave in place the existing regulations promulgated under the ALWTRP's DAM program. Therefore, since the existing DAM regulations do not identify gear modifications that may be allowed in a DAM zone, if a DAM zone were triggered, NMFS would only have the options of requiring the removal of all lobster trap and anchored gillnet gear from a DAM zone or issuing an alert requesting the voluntary removal of all gear.

### 3.3 PREFERRED ALTERNATIVE

The preferred alternative is to amend the regulations implementing the DAM component of the ALWTRP by identifying gear modifications that NMFS may require after a DAM zone is triggered. These temporary restrictions may affect lobster trap and anchored gillnet fisheries to achieve the goal of further reducing the entanglement risk to right whales in commercial fishing gear as required by the ESA and MMPA. The gear modifications proposed by this action are based on those already implemented in the SAM program, but allowing for the use of two endlines and floating line on the bottom one-third of each line as follows:

### Lobster Trap Gear

Fishermen utilizing lobster trap gear within the portion of the Northern Nearshore Lobster Waters, Southern Nearshore Lobster Waters, Northern Inshore State Lobster Waters, Cape Cod Bay Restricted Area (May 16 through December 31), and Stellwagen Bank/Jeffreys Ledge Restricted Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines must be made entirely of either sinking or neutrally buoyant line. Floating groundlines are prohibited;
- All buoy lines must be made of either sinking or neutrally buoyant line except the bottom portion of the line, which may be a section of floating line not to exceed one-third the overall length of the buoy line;
- A weak link must be placed at all buoys with a maximum breaking strength of 600 lb; and
- Fishermen are allowed to use two buoy lines

Fishermen utilizing lobster trap gear within the portion of the Great South Channel Restricted Lobster Area (July 1 through March 31) and Offshore Lobster Waters Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines must be made of either sinking or neutrally buoyant line. Floating groundlines are prohibited;
- All buoy lines must be made of either sinking or neutrally buoyant line except the bottom portion of the line, which may be a section of floating line not to exceed one-third the overall length of the buoy line;
- Fishermen are allowed to use two buoy lines; and
- A weak link must be placed at all buoys with a maximum breaking strength of 1,500 lbs.

#### Anchored Gillnet Gear

Fishermen utilizing anchored gillnet gear within the portion of the Other Northeast Gillnet Waters, Cape Cod Bay Restricted Area (May 16 through December 31), Stellwagen Bank/Jeffreys Ledge Restricted Area, Great South Channel Restricted Gillnet Area (July 1 through March 31), Great South Channel Sliver Restricted Area (July 1 through March 31), and Mid-Atlantic Coastal Waters that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines must be made of sinking or neutrally buoyant line. Floating groundlines are prohibited;
- All buoy lines must be made of either sinking or neutrally buoyant line except the bottom portion of the line, which may be a section of floating line not to exceed one-third the overall length of the buoy line;
- Fishermen are allowed to use two buoy lines;
- Each net panel must have a total of 5 weak links with a maximum breaking strength of 1,100 lbs. Net panels are typically 50 fathoms in length, but the weak link requirements would apply to all variations in panel size. These weak links must include 3 floatline weak links. The placement of the weak links on the floatline must be, one at the center of the net panel and one each as close as possible to each of the bridle ends of the net panel. The remaining 2 weak links must be placed in the center of each of the up and down lines at the panel ends; and
- · All anchored gillnets, regardless of the number of net panels, must

be securely anchored with the holding power of at least a 22 lb Danforth style anchor at each end of the net string.

## 3.4 NON PREFERRED ALTERNATIVE 2

This alternative would implement the same gear modifications as described in Section 3.3 except that fishermen would be required to use entirely sinking or neutrally buoyant endlines and groundlines.

#### 4.0 AFFECTED ENVIRONMENT

The affected environment was discussed in detail in Section 6.0 of the Environmental Assessment published on July 15, 1997 (NMFS 1997) and incorporated by reference in Section 4.0 of the December 27, 2001 Environmental Assessment (NMFS 2001). The physical area affected by this action is the region of the East Coast north of 40° N. latitude. The specific areas affected by the action are the Northeast Lobster and Gillnet waters described in Sections 3.1.1 and 3.1.2 of the July 15, 1997, Environmental Assessment. The biological resources potentially affected by this action are also described in detail in the 1997 Environmental Assessment (NMFS 1997) and incorporated by reference in the 2001 Environmental Assessment (NMFS 2001). Updates are provided in Section  $5.1\ \mathrm{below}$ . The main goal of the ALWTRP is to reduce serious injury and mortality of large whales in commercial fisheries. The proposed action was developed to accomplish that goal by reducing the threat of injury to large whales from entanglement in fixed commercial fishing gear. Therefore, the general effect of this action to large whales (the primary marine resource affected by this action) should be beneficial.

### 4.1 STATUS OF THE LARGE WHALES

The status of the large whales is discussed in detail in Section 2.2 of the Environmental Assessment published on July 15, 1997 (NMFS 1997). The following is provided as an update of that section.

The information in this section is from the 2002 Marine Mammal Stock Assessments (Waring et al., 2002), and from entanglement reports compiled by NMFS between 1998 and 2002. The detailed reports for entanglements up to 2000 are contained in the 2002 Stock Assessments. Summaries of the 1999, 2000, 2001, and 2002 entanglements are provided below for each species. Additional information about the population biology and human-caused sources of mortalities and serious injuries is included in the 2002 Marine Mammal Stock Assessments which are available from NMFS and on an internet web page (www.nefsc.nmfs.gov/psb/assesspdfs.htm).

# 4.1.1 North Atlantic Right Whale

Right whales have occurred historically in all the world's oceans from temperate to subarctic latitudes, with their distribution correlated to the distribution of their zooplankton prey (Perry et al. 1999). In both hemispheres they have been observed at low latitudes and nearshore waters where calving takes place, and then tend to migrate to higher latitudes during the summer (Perry et al. 1999).

The scientific literature on right whales has historically recognized distinct eastern and western populations or subpopulations in the North Atlantic Ocean (IWC 1986). Current information on the eastern stock is lacking and it is unclear whether a viable population in the eastern North Atlantic still exists (Brown 1986, NMFS 1991b). This EA will focus on the western North Atlantic subpopulation of right whales which occurs in the proposed action area.

North Atlantic right whales generally occur west of the Gulf Stream. They are not found in the Caribbean and have been recorded only rarely in the Gulf of Mexico. Like other baleen whales, they occur in the lower latitudes and more coastal waters during the winter, where calving takes place, and then tend to migrate to higher latitudes for the summer. The distribution of right whales in summer and fall appears linked to the distribution of their principal zooplankton prey (Winn et al. 1986). New England waters include important foraging habitat for right whales and at least some right whales are present in these waters throughout most months of the year. They are most abundant in Cape Cod Bay between February and April (Hamilton and Mayo 1990; Schevill et al. 1986; Watkins and Schevill 1982) and in the Great South Channel in May and June (Kenney et al. 1986, Payne et al. 1990) where they have been observed feeding predominantly on copepods, largely of the genera Calanus and Pseudocalanus (Waring et al. 2002). Right whales also frequent Stellwagen Bank and Jeffreys Ledge, as well as Canadian waters including the Bay of Fundy and Browns and Baccaro Banks, in the spring and summer months. Mid-Atlantic waters are used as a migratory pathway from the spring and summer feeding/nursery areas to the winter calving grounds off the coast of Georgia and Florida.

There is, however, much about right whale movements and habitat that is still not known or understood. Based on photo-identification, it has been shown that of 396 identified individuals, 25 have never been seen in any inshore habitat, and 117 have never been seen offshore (IWC 2001). Telemetry data have shown lengthy and somewhat distant excursions into deep water off of the continental shelf (Mate et al. 1997). Photo-id data have also indicated excursions of animals as far as Newfoundland, the Labrador Basin, southeast of Greenland (Knowlton et al. 1992), and Norway (IWC 2001). During the winter of 1999/2000, appreciable numbers of right whales were recorded in the Charleston, S.C. area. Because survey efforts in the Mid-Atlantic have been limited, it is unknown whether this is typical or whether it represents a northern expansion of the normal winter range, perhaps due to unseasonably warm waters.

Data collected in the 1990s suggested that western North Atlantic right whales were experiencing a slow, but steady recovery (Knowlton et al. 1994). However, more recent data strongly suggest that this trend has reversed and the species is in decline (Caswell et al. 1999, Fujiwara and Caswell 2001).

While it is not possible to obtain an exact count of the number of western North Atlantic right whales, IWC participants from a 1999

workshop agreed that it is reasonable to state that the current number of western North Atlantic right whales is probably around 300 (+/-10%) (IWC 2001). This conclusion was based, in large part, on a photo-id catalog comprising more than 14,000 photographed sightings of 396 individuals, 11 of which were known to be dead and 87 of which had not been seen in more than 6 years. In addition, it was noted that relatively few new non-calf whales (whales that were never sighted and counted in the population as calves) had been sighted in recent years (IWC 2001) suggesting that the 396 individuals is a close approximation of the entire population. Since the 1999 IWC workshop, there have been at least 72 right whale births; 1 in 2000, 31 in 2001, 22 in 2002, and 18 in 2003. In addition, one animal was "resurrected" meaning that it was seen after an absence of at least 6 years. However, at least four of the calves are known to be dead and a fifth was not resighted with its mother on the summer foraging grounds. Three adult right whales are known to have died and two are suspected of having died since the 1999 IWC workshop. Although the "count" of right whales is based on the original count of 396 individually identified whales, the number of observed right whale births and the known and presumed mortalities equals 342 animals, for the purposes of this EA, NMFS considers the best approximation for the number of North Atlantic right whales to be approximately 300 (+/- 10%) given that all mortalities are not known. The sightings data and genetics data also support the conclusion that, as found previously, calving intervals have increased (from 3.67 years in 1992 to 5.8 years in 1998) and the survival rate has declined (IWC 2001). Even more alarming, the mortality of mature, reproductive females has increased, causing declines in population growth rate, life expectancy and the mean lifetime number of reproductive events between the period 1980-1995 (Fujiwara and Caswell 2001). In addition, for reasons which are unknown, many (presumed) mature females are not yet known to have given birth (an estimated 70 percent of mature females are reproductively active). Simply put, the western North Atlantic right whale population is declining because the trend over the last several years has been a decline in births coupled with an increase in mortality.

Factors that have been suggested as affecting right whale reproductive success and mortality include reduced genetic diversity, pollutants, and nutritional stress. However, there is no evidence available to determine their potential effect, if any, on western North Atlantic right whales. The size of the western North Atlantic subpopulation of right whales at the termination of whaling is unknown, but is generally believed to have been very small. Such an event may have resulted in a loss of genetic diversity which could affect the ability of the current population to successfully reproduce (i.e., decreased conceptions, increased abortions, and increased neonate mortality). Studies by Schaeff et al. (1997) and Malik et al. (2000) indicate that western North Atlantic right whales are less genetically diverse than southern right whales. However, several apparently healthy populations of cetaceans, such as sperm whales and pilot whales, have even lower genetic diversity than observed for western North Atlantic right whales (IWC 2001). Similarly, while contaminant studies have

confirmed that right whales are exposed to and accumulate contaminants, researchers could not conclude that these contaminant loads were negatively affecting right whales since concentrations were lower than those found in marine mammals proven to be affected by PCB's and DDT (Weisbrod et al. 2000). Finally, although North Atlantic right whales appear to have thinner blubber than right whales from the South Atlantic (Kenney 2000), there is no evidence at present to demonstrate that the decline in birth rate and increase in calving interval is related to a food shortage. These concerns were also discussed at the 1999 IWC workshop where it was pointed out that since Calanus sp. is the most common zooplankton in the North Atlantic and current right whale abundance is greatly below historical levels, the proposal that food limitation was the major factor seemed questionable (IWC 2001).

Anthropogenic mortality in the form of ship strikes and fishing gear entanglements do, however, appear to be affecting the recovery of western North Atlantic right whales. Data collected from 1970 through 1999 indicate that anthropogenic interactions are responsible for a minimum of two-thirds of the confirmed and possible mortality of nonneonate animals (Knowlton and Kraus 2001). Of the 45 right whale mortalities documented during this period, 16 were due to ship collisions and three were due to entanglement in fishing gear (there were also 13 neonate deaths and 13 deaths of non-calf animals from unknown causes) (Knowlton and Kraus 2001). Based on the criteria developed by Knowlton and Kraus (2001), 56 additional serious injuries and mortalities from entanglement or ship strikes are believed to have occurred between 1970 and 1999: 25 from ship strikes and 31 from entanglement. Nineteen were considered to be fatal interactions (16 ship strikes, 3 entanglements). Ten were possibly fatal (2 ship strikes, 8 entanglements), and 27 were non-fatal (7 ship strikes, 20 entanglements) (Knowlton and Kraus 2001). Scarification analysis also provides information on the number of right whales which have survived ship strikes and fishing gear entanglements. Based on photographs of catalogued animals from 1959 and 1989, Kraus (1990) estimated that 57 percent of right whales exhibited scars from entanglement and 7 percent from ship strikes (propeller injuries). This work was updated by Hamilton et al. (1998) using data from 1935 through 1995. The new study estimated that 61.6 percent of right whales exhibit injuries caused by entanglement, and 6.4 percent exhibit signs of injury from vessel strikes. In addition, several whales have apparently been entangled on more than one occasion. Some right whales that have been entangled were subsequently involved in ship strikes. Because some animals may drown or be killed immediately, the actual number of interactions is expected to be higher.

As described in Section 2.1, a previous section 7 consultation on the three FMPs for the Monkfish, Multispecies, and Spiny Dogfish fisheries and the Federal regulations for the American Lobster fishery was concluded on June 14, 2001, and found that proposed activities under these regulations were likely to jeopardize the continued existence of the northern right whale. In response to the jeopardy conclusion, NMFS Protected Resources Division developed one RPA with multiple

management components. These measures include: Seasonal and Dynamic Area Management, an expansion of gillnet gear modifications, and continued gear research and modifications. Cumulatively, these measures were developed to eliminate mortalities and serious injuries of right whales in lobster trap and anchored gillnet gear, eliminate serious and prolonged entanglements, and significantly reduce the total number of right whale entanglements in lobster trap and anchored gillnet gear and associated scarification observed on right whales. In addition, the RPA included measures to help monitor the effectiveness of this RPA. For example, if a right whale is killed or seriously injured in lobster trap or anchored gillnet gear, gear that is identifiable as being approved for use in the lobster or gillnet fishery, or gear that cannot be identified as being associated with a specific fishery, this will be considered evidence that the measures outlined in the RPA are not demonstrably effective at reducing right whale injuries or death. Also, if the estimated number of right whale entanglements in any gear or scarring in 2002 and subsequent years increases or remains the same as the lowest annual level of the three preceding years (2002 would be compared with the lowest level that occurred in 1999, 2000, and 2001), this would also constitute evidence that the measures outlined in the RPA are not demonstrably effective at reducing right whale injuries or deaths. The number of new observed right whale entanglements for 1999, 2000, 2001, and 2002 were six, five, three, and eight, respectively. Scarification analysis is completed on an annual basis after the end of the calendar year. Thus, scarification analysis for 2002 will be completed after the end of the 2002 calendar year.

As mentioned above, eight right whale entanglements were observed in 2002. The first of these is a male right whale identified as #1424. Right Whale #1424 is an adult male that is at least twenty-one years old. He was first observed entangled on February 12, 2002, off of Amelia Island, FL. Prior to this sighting, he had last been seen (not entangled) on September 17, 2001. The whale is entangled in heavy, marine line (of unknown origin) that may be wrapped around the whale's rostrum and with a looser loop over the back. Right whale #1424 has been seen four times since February 12, 2002. Poor weather conditions and the whales behavior have affected attempts at disentanglement. Most recently, #1424 was resighted on April 14, 2003, still entangled, 7.5 mi SW of Wood End, Cape Cod, MA.

The second right whale is a yearling of unknown sex, identified as #3120. This whale was first sighted entangled on April 7, 2002, off of Cape Fear, North Carolina. Images of the whale taken by a party boat captain reveal an entanglement with multiple wraps of line around the body and line in the mouth. The origin of this line has not been identified. This whale was resighted on May 24, 2002, in the Great South Channel approximately 36 nm east of Nantucket, however, the disentanglement team could not respond due to poor weather conditions. Right whale #3120 was last seen (without entangling line) in the company of its mother on December 23, 2001, in the southeast right whale calving area. This right whale has also been re-sighted in the in the Bay of Fundy. In the Bay of Fundy, the New England Aquarium

(NEAq) launched disentanglement efforts on August 21 and 24, 2002, where some line and a buoy was removed. This whale was resighted by Florida Marine Research Institute (FMRI) on February 19, 2003, off of Jacksonville Beach, Florida. Photo documentation analyzed by the New England Aquarium (NEAq) indicate that the overall health of the whale has not deteriorated and has likely improved somewhat since the last images taken on August 24, 2002. Further documentation and assessment of this entanglement are needed. The whale was seen briefly and photographed on February 20, 2003, by a right whale Early Warning System (EWS) survey flight, but was not recognized as being entangled before contact was lost.

The third entangled right whale was first sighted by whale watch vessel crews near Brier Island, Nova Scotia, in the Bay of Fundy on July 6, 2002. This individual was later identified as #3107, a female born in 2001. There were a number of wraps of line around the tail stock and an orange ball near the flukes. On August 1, 2002, staff from NEAq on board the R/V Neried, encountered the right whale and, under the authority of the Canadian Department of Fisheries and Oceans, unsuccessfully attempted to disentangle the animal. More attempts were made by NEAq team to attach a telemetry buoy and/or to disentangle on August 9 and 10; both were unsuccessful. Center for Coastal Studies (CCS) staff believed this is a life threatening entanglement with serious wounds noted on the tail stock and flukes. During another attempt on September 1, the NEAq team reported that they had cut and removed the entangling line on the tail, and that the whale was disentangled. On September 30, 2002 the NOAA SAS team sighted #3107 east of Cape Cod - they noted fresh peduncle scars, a heavy cyamid load, grayish coloring, and seemingly fat body condition. On October 12, 2002 the carcass of #3107 washed up in Sconset, Nantucket. Necropsy results are pending.

A fourth entangled right whale, identified as #1427, an 18 year old male, was first sighted entangled on July 12, 2002, by a recreational boater approximately 10 nm off of Atlantic City, NJ. The trailing line was shortened and the animal was tagged with a telemetry buoy on the evening of July 12 by CCS. More than 200 feet of 1/2" to 5/8" green line was removed. Images taken at a second sighting show a tight, white line wrapping the forward part of the rostrum. The whale was monitored as it moved south along the eastern coast of the US and was photographed and intercepted on several occasions (7/15 - Kitty Hawk, NC., 7/16 - Cape Hatteras, NC), however, on July 17, 2002, the telemetry buoy was removed by a well intentioned boater. Despite the loss of the tag, the whale was seen two more times (7/21-Charleston, SC., 7/23-St Simons Island, GA), but efforts to coordinate resources in attempts to reapply the tag were unsuccessful.

The fifth entanglement of 2002, a right whale identified as #2320, an adult female of unknown age, was sighted entangled 3 nm west of Boar's Head, Long Island, Nova Scotia, on August 4, 2002. The entanglement is around the rostrum with fairly small diameter, green rope. The lack of trailing gear from this whale has hindered a disentanglement attempt. The entanglement was documented by Canadian Coast Guard and

whale researchers, but attempts to apply a telemetry tag or to perform a disentanglement were unsuccessful. This whale was resighted by the CCS R/V Shearwater on March 24, 2003 east of Nauset Beach, Cape Cod, Massachusetts. CCS attempted to attach a telemetry buoy to the trailing line for several hours but were not successful. Photo documentation and observer accounts show that the entanglement around the head is much the same as it was in August with a slight shift in the exact positioning. New information includes the confirmation of at least 40 feet of trailing line and 2 large wounds on the right flank. The whale appeared robust with good color. Right Whale #2320 was most recently resighted on April 28,2003, by the CCS Aerial survey. Digital images were blurry due to inclement weather. The whale was lost and the search was abandoned due to weather. Of note, she was seen gear free on August 2, 2002 in the Bay of Fundy, just two days prior to being sighted entangled.

A sixth entangled right whale was sighted by Canadian Coast Guard staff in Miramichi Bay, Gulf of St. Lawrence, Canada on August 10, 2002. The whale was temporarily named the "Mirimichi Right Whale," and the only information on this whale comes from Coast Guard description of green rope on the tail and inconclusive photos. It is unclear if this is a newly entangled whale, although the description does not match any other entangled right whales.

A seventh entangled right whale, #1815, an adult female, was first sighted entangled on August 22, 2002, in Roseway Basin by the NOAA Fisheries research vessel, *Delaware II*. The crew documented the entanglement and took a biopsy of the whale. The line was seen across the back and rostrum. #1815 was last sighted prior to this entanglement on September 20, 2001. #1815 was a mother in 2001 and has given birth to at least two calves.

Finally, on August 30, 2002, the NEAq research vessel *Nereid* reported an entangled right whale in the Bay of Fundy. The whale was part of a Surface Active Group (SAG) and had tight wraps of line on the rostrum. Photographs by NEAq indicate that the individual is not one of the known entangled right whales to date. This whale was resighted in the Bay of Fundy on September 2 and 26.

In 2003, to date, there have been two new reports of entangled right whales. Right whale #2240, an adult female, was first sighted entangled on January 14, 2003, off of Ponta Vedra Beach, Florida. The entanglement was documented by the FMRI aerial survey team. She was first identified by New England Aquarium in 1992 and has been seen every year since. In 2000, while in the Bay of Fundy, she was implanted with a satellite tag which accounts for the large divot seen on her back. She mothered a calf, #3130, in 2001. Images taken indicate an apparently healthy whale (not thin or discolored) with no injuries and a single line through the mouth. Further documentation and assessment is needed. She was last seen gear free on May 5, 2002.

A second entangled right whale was sighted on May 20, 2003, by the NOAA SAS twin otter approximately 45 NM northeast of Race Point, Cape

Cod, in the area of southern Wilkinson Basin. Photo documentation identified the whale as #1430, a reproductively active female first seen in 1984 and not previously known to be entangled. disentanglement team responded aboard the R/V Shearwater and a second twin otter reported to the scene to continue assisting the ship. whale was lost before the Shearwater and second plane were on the scene. The team of two planes and the Shearwater were not able to relocate the whale due to deteriorating conditions. The whale was not seen during aerial searches of the area in subsequent days. The entanglement is reported as a mouth entanglement with two green lines exiting the left side of the mouth and crossing over the back. One of the lines appears to pass under the right flipper, without wrapping the flipper, and then trails approximately 20 ft aft of the flukes to a frayed end. The bitter end of the other line is unseen, and no body wraps are noted. A full assessment of the entanglement will become available pending further investigation.

The North Atlantic right whales' preference for coastal habitat, its proximity to major shipping lanes, and the mechanism by which it feeds (filtering large volumes of water) likely make it more susceptible to fishing gear entanglements and ship strikes as compared to other cetacean species. In addition, North Atlantic right whales also forage in Canadian waters where, until the recent enactment of the Species at Risk Act (SARA), the species was afforded less protection, and where fishing gear and large ship traffic are also prevalent. For purposes of this EA, NMFS considers the current size of the western North Atlantic right whale subpopulation to be approximately 300 animals (+/-10%). Based on recent reviews of the status of right whales (Caswell et al. 1999, IWC 2001, Knowlton and Kraus 2001, Fujiwara and Caswell 2001), NMFS also considers that, despite the birth of 72 right whales over the last four seasons, the current trend indicates an overall decline in calving for unknown reasons, and high anthropogenic mortality occurring from at least two sources (ship strikes and fishing gear entanglement). Recently, the mortality of mature, reproductively active females appears to have increased, although modeling suggests that population declines resulting from these mortalities could be reversed by preventing the deaths of two female right whales per year (Fujiwara and Caswell 2001). However, there is no evidence that the decline of this subpopulation has been reversed, particularly given the continuing level of observed anthropogenic interactions. Therefore, for the purposes of this EA, NMFS considers the western North Atlantic subpopulation of right whales to be declining.

#### 4.1.2 Humpback Whale

Humpback whales inhabit all major ocean basins from the equator to subpolar latitudes. They generally follow a predictable migratory pattern in both hemispheres, feeding during the summer in the higher near-polar latitudes and migrating to lower latitudes where calving and breeding takes place in the winter (Perry et al. 1999).

In the North Atlantic, humpback whales calve and mate in the West Indies and migrate to feeding areas in the northwestern Atlantic during the summer months. Most of the humpbacks that forage in the Gulf of Maine visit Stellwagen Bank and the waters of Massachusetts and Cape Cod Bays. Sightings are most frequent from mid-March through November between 41°N and 43°N, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank and Jeffreys Ledge (CeTAP 1982) and peak in May and August. Small numbers of individuals may be present in this area year-round, including the waters of Stellwagen Bank. They feed on a number of species of small schooling fishes, particularly sand lance and Atlantic herring, by targeting fish schools and filtering large amounts of water for their associated prey. Humpback whales have also been observed feeding on krill (Wynne and Schwartz 1999).

In the winter, whales from the six feeding areas (including the Gulf of Maine) mate and calve primarily in the West Indies where spatial and genetic mixing among these groups occur (Waring et al. 2002). Various papers (Clapham and Mayo 1990, Clapham 1992, Barlow and Clapham 1997, Clapham et al. 1999) summarized information gathered from a catalogue of photographs of 643 individuals from the western North Atlantic population of humpback whales. These photographs identified reproductively mature western North Atlantic humpbacks wintering in tropical breeding grounds in the Antilles, primarily on Silver and Navidad Banks, north of the Dominican Republic. The primary winter range also includes the Virgin Islands and Puerto Rico (NMFS 1991a). Calves are born from December through March and are about 4 meters at birth. Sexually mature females give birth approximately every 2 to 3 years. Sexual maturity is reached between 4 and 6 years of age for females and between 7 and 15 years for males. Size at maturity is about 12 meters.

Humpback whales use the Mid-Atlantic as a migratory pathway to and from the calving/mating grounds, but it may also be an important winter feeding area for juveniles. Since 1989, observations of juvenile humpbacks in the Mid-Atlantic have been increasing during the winter months, peaking January through March (Swingle et al. 1993). Biologists theorize that non-reproductive animals may be establishing a winter feeding range in the Mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. al. (1993) identified a shift in distribution of juvenile humpback whales in the nearshore waters of Virginia, primarily in winter months. Identified whales using the Mid-Atlantic area were found to be residents of the Gulf of Maine and Atlantic Canada (Gulf of St. Lawrence and Newfoundland) feeding groups, suggesting a mixing of different feeding populations in the Mid-Atlantic region. Strandings of humpback whales have increased between New Jersey and Florida since 1985 consistent with the increase in Mid-Atlantic whale sightings. Strandings were most frequent during September through April in North Carolina and Virginia waters, and were composed primarily of juvenile

humpback whales of no more than 11 meters in length (Wiley et al. 1995).

Providing a reliable abundance estimate for the Gulf of Maine humpback whale feeding group is problematic (Waring et al. 2002). Three approaches have been investigated: mark-recapture estimates, minimum population size, and line transect estimates (Waring et al. 2002). The line transect estimate has been chosen as the best estimate of abundance for Gulf of Maine humpback whales with an estimate of 902 whales (Palka 2000). Photographic mark-recapture analyses from the Years of the North Atlantic Humpback (YONAH) project gave an ocean-basin-wide estimate of 11,570 (CV=0.069) (Waring et al. 2002). For management purposes under the MMPA, the estimate of 11,570 is regarded as the best available estimate for the North Atlantic population, although because YONAH sampling was not spatially representative in the feeding grounds, this figure is negatively biased (Waring et al. 2002).

Humpback whales, like other baleen whales, may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries, coastal development and vessel traffic. However, evidence of these is lacking. There are strong indications that a mass mortality of humpback whales in the southern Gulf of Maine in 1987/1988 was the result of the consumption of mackerel whose livers contained high levels of a red-tide toxin. It has been suggested that red tides are somehow related to increased freshwater runoff from coastal development but there is insufficient data to link this with the humpback whale mortality (Clapham et al. 1999). Changes in humpback distribution in the Gulf of Maine have been found to be associated with changes in herring, mackerel, and sand lance abundance associated with local fishing pressures (Waring et al. 2002). However, there is no conclusive evidence that humpback whales were adversely affected by these trophic changes.

As is the case with other large whales, the major known sources of anthropogenic mortality and injury of humpback whales occur from commercial fishing gear entanglements and ship strikes. Sixty percent of Mid-Atlantic humpback whale mortalities that were closely investigated showed signs of entanglement or vessel collision (Wiley et al. 1995). Between 1992 and 2001 at least 92 humpback whale entanglements and 10 ship strikes (this includes an interaction between a humpback whale and a 33' pleasure boat) were recorded. There were also many carcasses that washed ashore or were spotted floating at sea for which the cause of death could not be determined. Based on photographs of the caudal peduncle of humpback whales, Robbins and Mattila (1999) estimated that at least 48 percent - and possibly as many as 78 percent - of animals in the Gulf of Maine exhibit scarring caused by entanglement. These estimates are based on

sightings of free-swimming animals that initially survive the encounter. Because some whales may drown immediately, the actual number of interactions may be higher.

NMFS considers the best estimate for the entire North Atlantic humpback population to be 11,570 and the best estimate for the Gulf of Maine feeding population of humpback whales (the focus of this EA) is 902. Anthropogenic mortality associated with ship strikes and fishing gear entanglements is significant. The winter range where mating and calving occurs is located in areas outside of the United States where the species is afforded less protection. Despite this, modeling using data obtained from photographic mark-recapture studies estimates the growth rate of the Gulf of Maine feeding population at 6.5 percent (Barlow and Clapham 1997). With respect to the species overall, there are also indications of increasing abundance for the eastern and central North Pacific stocks. However, trend and abundance data is lacking for the western North Pacific stock, the Southern Hemisphere humpback whales, and the Southern Indian Ocean humpbacks. Given the best available information, changes in status of the North Atlantic humpback population are, therefore, likely to affect the overall survival and recovery of the species.

#### 4.1.3 Fin Whale

Fin whales inhabit a wide range of latitudes between 20-75° N and 20-75° S (Perry et al. 1999). Fin whales spend the summer feeding in the relatively high latitudes of both hemispheres, particularly along the cold eastern boundary currents in the North Atlantic and North Pacific Oceans and in Antarctic waters (IWC 1992).

During 1978-1982 aerial surveys, fin whales accounted for 24 percent of all cetaceans and 46 percent of all large cetaceans sighted over the continental shelf between Cape Hatteras and Nova Scotia (Waring et al.2002). Underwater listening systems have also demonstrated that the fin whale is the most acoustically common whale species heard in the North Atlantic (Clark 1995). The single most important area for this species appeared to be from the Great South Channel, along the 50m isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffreys Ledge (Hain et al.1992).

Like right and humpback whales, fin whales are believed to use North Atlantic waters primarily for feeding, and the more southern waters for calving. However, evidence regarding where the majority of fin whales winter, calve, and mate is still scarce. Clark (1995) reported a general pattern of fin whale movements in the fall from the Labrador/Newfoundland region, south past Bermuda and into the West Indies, but neonate strandings along the U.S. Mid-Atlantic coast from October through January suggest the possibility of an offshore calving area (Hain et al. 1992).

Fin whales achieve sexual maturity at 5-15 years of age (Perry et al. 1999), although physical maturity may not be reached until 20-30 years (Aguilar and Lockyer 1987). Conception is believed to occur during the winter with birth of a single calf after a 12 month gestation (Mizroch and York 1984). The calf is weaned 6-11 months after birth (Perry et al. 1999). The mean calving interval is 2.7 years (Agler et al. 1993).

The predominant prey of fin whales varies greatly in different geographical areas depending on what is locally available (IWC 1992). In the western North Atlantic, fin whales feed on a variety of small schooling fish (i.e., herring, capelin, sand lance) as well as squid and planktonic crustaceans (Wynne and Schwartz 1999). As with humpback whales, fin whales feed by filtering large volumes of water through their baleen plates for their prey.

NMFS has designated one population of fin whale for U.S. waters of the North Atlantic (Waring et al. 2002) where the species is commonly found from Cape Hatteras northward although there is information to suggest some degree of separation. A number of researchers have suggested the existence of fin whale subpopulations in the North Atlantic based on local depletions resulting from commercial overharvesting (Mizroch and York 1984) or genetics data (Bérubé et al. 1998). Photoidentification studies in western North Atlantic feeding areas, particularly in Massachusetts Bay, have shown a high rate of annual return by fin whales, both within years and between years (Seipt et al. 1990) suggesting some level of site fidelity. In 1976, the IWC's Scientific Committee proposed seven stocks (or populations) for North Atlantic fin whales. These are: (1) North Norway, (2) West Norway-Faroe Islands, (3) British Isles-Spain and Portugal, (4) East Greenland-Iceland, (5) West Greenland, (6) Newfoundland-Labrador, and (7) Nova Scotia (Perry et al. 1999). However, it is uncertain whether these boundaries define biologically isolated units (Waring et al. 1999).

Various estimates have been provided to describe the current status of fin whales in western North Atlantic waters. One method used the catch history and trends in Catch Per Unit Effort to obtain an estimate of 3,590 to 6,300 fin whales for the entire western North Atlantic (Perry et al. 1999). Hain et al. (1992) estimated that about 5,000 fin whales inhabit the Northeastern United States continental shelf waters. The 2002 Stock Assessment Report (SAR) gives a best estimate of abundance for fin whales of 2,814 (CV = 0.21). The minimum population estimate for the western North Atlantic fin whale is 2,362 (Waring et al. 2002). However, this is considered an underestimate since the estimate derives from surveys over a limited portion of the western North Atlantic.

Like right whales and humpback whales, anthropogenic mortality and injury of fin whales include entanglement in commercial fishing gear and ship strikes. Of 18 fin whale mortality records collected between 1991 and 1995, four were associated with vessel interactions, although the proximal cause of mortality was not known. From 1996-July 2001, there were nine observed fin whale entanglements and at least four ship strikes. It is believed to be the most commonly struck cetacean by large vessels (Laist et al. 2001). In addition, hunting of fin whales continued well into the 20th century. Fin whales were given total protection in the North Atlantic in 1987 with the exception of a subsistence whaling hunt for Greenland (Gambell 1993, Caulfield 1993). However, Iceland reported a catch of 136 whales in the 1988/89 and 1989/90 seasons, and has since ceased reporting fin whale kills to the IWC (Perry et al. 1999). In total, there have been 239 reported kills of fin whales from the North Atlantic from 1988 to 1995.

The minimum population estimate for the western North Atlantic fin whale is 2,362 which is believed to be an underestimate. North Atlantic fin whales do appear to be less affected by fishing gear as compared to North Atlantic right and humpback whales. However, of these three, it is the most commonly struck by large vessels (Laist et al. 2001). Some level of whaling for fin whales in the North Atlantic may still occur.

Information on the abundance and population structure of fin whales worldwide is limited. NMFS recognizes three fin whale stocks in the Pacific for the purposes of managing this species under the MMPA. These are: Alaska (Northeast Pacific), California/Washington/Oregon, and Hawaii (Angliss et al. 2001). Reliable estimates of current abundance for the entire Northeast Pacific fin whale stock are not available (Angliss et al. 2001). Stock structure for fin whales in the southern hemisphere is unknown and there are no current estimates of abundance for southern hemisphere fin whales. Given the best available information, changes in status of the North Atlantic fin whale population are, therefore, likely to affect the overall survival and recovery of the species.

# 4.1.4 Minke Whale

Minke whales off the eastern coast of the United States are considered to be part of the Canadian east coast population, which inhabits the area from the eastern half of Davis Strait south to the Gulf of Mexico. The best estimate of the population is 4,018 (Waring et al. 2002). The minimum population estimate for Canadian east coast minke whales is 3,515 (Waring et al. 2002). The current and maximum net productivity rates are not known, but the maximum rate is assumed to be 0.04. The PBR for this stock of minke whales is 35 (Waring et al. 2002). Because no minke whale mortalities have been observed since 1991, the annual estimated average Northeast sink gillnet fishery-related mortality for this species is zero (Waring et al. 2002). Annual mortalities attributed to the Mid-Atlantic coastal gillnet

fishery, as determined from strandings and entanglement records were 0 in 1991, 1992, 1994, 1995, 1996, 1997, 1999, and 2000 and 1 in 1998 (Waring et al. 2002). Estimated average annual mortality related to this fishery during 1995 to 1999 was 0.2 minke whales per year (Waring et al. 2002). Annual mortalities attributed to the Gulf of Maine and Mid-Atlantic lobster trap fishery, as determined from strandings and entanglement records that have been audited, were 1 in 1991, 2 in 1992, 1 in 1994, 1 in 1995, 0 in 1996, 1 in 1997, and 0 in 1998 to 2000 (Waring et al. 2002). Estimated average annual mortality related to this fishery during 1996 to 2000 was 0.2 minke whales per year (Waring et al. 2002).

### 5.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

The MMPA mandates goals for the ALWTRP to reduce incidental serious injury and mortality of large whales in commercial fisheries to below PBR and then to insignificant levels approaching a Zero Mortality Rate Goal (ZMRG). For right whales, this provides the goal of eliminating serious injury or death resulting from incidental take in commercial fisheries. Under the ESA, NMFS must also insure that any action the agency authorizes, such as commercial fishing for lobster, monkfish, multispecies and dogfish, does not jeopardize the continued existence of right whales. This action was developed to facilitate reaching these goals by reducing the threat of injury to right whales from entanglement in fixed fishing gear. Therefore, the general effect of this action to right whales (the primary marine resource affected by this action) is expected to be beneficial. Other marine mammals who are in an area determined to be a DAM zone may also benefit from the imposition of restrictions during the temporary period. Other protected resources, such as leatherback sea turtles, are known to become entangled in lobster buoy lines. Therefore, the environmental consequences of each alternative for leatherback turtles may be similar to that identified for large whales.

Other species known to be affected by fixed gear are, of course, the fish species for which the gear is targeted. The environmental effects of the gear on targeted species are contained in the environmental documents for their FMPs.

The area affected by the proposed alternatives has been identified as Essential Fish Habitat (EFH) for species within the Northeast multispecies fishery, sea scallops, monkfish, and spiny dogfish. These proposed alternatives will not have an adverse impact on EFH. The basis for this determination is that the gear types involved, gillnet and lobster trap gear, have minimal interaction with EFH.

Lobster trap and anchored gillnet fishermen who operate in the areas that are determined to be DAM zones would also be affected by this action.

#### 5.1 NON PREFERRED ALTERNATIVE 1

The non preferred alternative 1 (NPA 1) plan would be to amend the regulations implementing the DAM component of the ALWTRP to identify SAM gear modifications as those that NMFS may require fishermen to comply with if they choose to fish in a DAM zone. These requirements would be in addition to the gear modifications currently required under the ALWTRP for the Offshore Lobster Waters, Northern Nearshore Lobster Waters, Southern Nearshore Lobster Waters, Northern Inshore State Lobster Waters, Stellwagen Bank/Jeffreys Ledge Restricted Area (lobster and gillnet area description), Cape Cod Bay Restricted Area (lobster and gillnet area description; May 16 through December 31), Great South Channel Restricted Gillnet and Lobster Area (July 1 through March 31), Great South Channel Sliver Restricted Area (gillnet area description: July 1 through March 31), Other Northeast Gillnet Waters, and Mid-Atlantic Coastal Waters (gillnet area description).

The gear modifications identified by this alternative are based on those already implemented in the Seasonal Area Management (SAM) program. The current SAM gear modifications are as follows:

# Lobster Trap Gear

Fishermen utilizing lobster trap gear within the portion of the Northern Nearshore Lobster Waters, Southern Nearshore Lobster Waters, Northern Inshore State Lobster Waters, Cape Cod Bay Restricted Area (May 16 through December 31), and Stellwagen Bank/Jeffreys Ledge Restricted Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines and buoy lines must be made entirely of either sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;
- A weak link must be placed at all buoys with a maximum breaking strength of 600 lb at each buoy; and
- Fishermen utilizing lobster trap gear within the DAM areas must utilize no more than one buoy line per trawl string. This buoy line must be at the northern or western end of the trawl string depending on the direction of the set.

Fishermen utilizing lobster trap gear within the portion of the Great South Channel Restricted Lobster Area (July 1 through March 31) and Offshore Lobster Waters Area that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

• Groundlines and buoy lines must be made of either sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;

- A weak link must be placed at all buoys with a maximum breaking strength of 1,500 lbs; and
- Fishermen utilizing lobster trap gear within the DAM areas must utilize no more than one buoy line per trawl string. This buoy line must be at the northern or western end of the trawl string depending on the direction of the set.

#### Anchored Gillnet Gear

Fishermen utilizing anchored gillnet gear within the portion of the Other Northeast Gillnet Waters, Cape Cod Bay Restricted Area (May 16 through December 31), Stellwagen Bank/Jeffreys Ledge Restricted Area, Great South Channel Restricted Gillnet Area (July 1 through March 31), Great South Channel Sliver Restricted Area (July 1 through March 31), and Mid-Atlantic Coastal Waters that overlap with a DAM zone may be required to utilize all the following gear modifications when a DAM zone is in effect:

- Groundlines and buoy lines must be made of sinking or neutrally buoyant line. Floating groundlines and buoy lines are prohibited;
- Each net panel must have a total of 5 weak links with a maximum breaking strength of 1,100 lbs each. Net panels are typically 50 fathoms in length, but the weak link requirements would apply to all variations in panel size. These weak links must include 3 floatline weak links. The placement of the weak links on the floatline must be, one at the center of the net panel and one each as close as possible to each of the bridle ends of the net panel. The remaining 2 weak links must be placed in the center of each of the up and down lines at the panel ends;
- Fishermen utilizing gillnets within the DAM areas must utilize no more than one buoy line per net string. This buoy line must be at the northern or western end of the gillnet string depending on the direction of the set; and
- All anchored gillnets, regardless of the number of net panels, must be securely anchored with the holding power of at least a 22 lb Danforth style anchor at each end of the net string.

### 5.1.1 Biological Impacts

Under the NPA 1 plan, NMFS would identify SAM modified gear as gear determined by NMFS to sufficiently reduce the risk of entanglement to North Atlantic right whales under the DAM program. Therefore, this would allow NMFS to utilize the option of gear modification within a DAM zone. Similar to the discussion provided in the SAM proposed rule (66 FR 59394, November 28, 2001), the first question that must be answered is what is meant by "sufficient risk reduction." It is not feasible, in the typical scientific fashion, to conduct and evaluate experiments on North Atlantic right whale interactions with modified gear. NMFS cannot conduct laboratory or field trials on North

Atlantic right whales to collect data. NMFS is able, however, to scrutinize past entanglements and learn from them ways to modify gear so that serious entanglements do not occur in the future. Since the issuance of the BOs, NMFS has conducted additional analysis of available data including that on the seasonal movement and congregations of right whales, previous entanglements, and the nature and position of gear in the water.

The first category of data that has been evaluated are past records of North Atlantic right whale entanglements to identify fishing gear that has been determined to pose an entanglement risk to right whales. Utilizing entanglement data from 1999-2001, NMFS concluded that fishing line in the water column presents the highest entanglement risk from fishing gear to the North Atlantic right whale. NMFS examined these cases to determine the cause of the entanglement and identified gear modifications that would sufficiently reduce such injuries or mortalities in the future. These cases involved buoy line, floating line, endline and groundline.

Floating groundline has been identified as the source of North Atlantic right whale entanglement because the line is designed to float in the water column to avoid contact with the bottom of the ocean during lower tides. The slack in the floating line is identified as a source of North Atlantic right whale entanglement. NMFS determined that typical offshore lobster pot gear is configured with approximately 7,000 ft (2,134 m) of floating line. Video recording of typical lobster gear with floating groundline between traps revealed that the line forms large loops in the water column between traps. Similar video recording of neutrally buoyant line between traps revealed that it did not have the same vertical profile as floating line; rather, it was located on or near the bottom and was not accessible to North Atlantic right whales as an entanglement risk. To minimize interactions between fishing gear and North Atlantic right whales, this alternative for DAM gear modifications would prohibit floating line for all lobster pot and gillnet gear within the DAM zones during the restricted period. NMFS estimates that by requiring sinking or neutrally buoyant line approximately 85 percent of the line within the water column would be eliminated.

Vertical line between the gear and the surface system is another source of entanglement. It is not technologically feasible at this time to remove all vertical lines from the water column, since there has to be some way for fishermen to haul a line at the surface to bring up gear from the sea floor. Consequently, because of this operational limitation, fishermen can only be expected to remove a maximum of one buoy line per trap trawl or net string. By requiring only a single buoy line per net string for gillnet gear and a single buoy line per trawl for lobster trap gear, NMFS initially assumed that the amount of vertical line in the water column would be further reduced by 50 percent. However, based on comments received, NMFS

understands that requiring one buoy line in a DAM area may result in fishermen splitting trawls into shorter sets, which may result in a greater number of buoy lines. Therefore, as some comments indicated, the risk of entanglement in buoy lines to right whales could actually be increased instead of decreased. Furthermore, information obtained after the publication of the proposed rule supports underwater video footage taken by NMFS and discussed in the EA/RIR, which demonstrates that allowing one-third polypropylene line on the bottom third of the buoy line does not necessarily produce a loop in the water column and, therefore, increase the risk to right whales due to current and tidal action on the surface.

The measures identified under the NPA 1 plan are expected to result in a reduction in the volume of line in the water column within a DAM zone. However, as discussed above, based on the comments received on the proposed rule, NMFS may have overestimated the amount of reduction in vertical line anticipated under the NPA 1 plan from the use of one buoy line and the prohibition on the use of floating line. Therefore, to further reduce the risk posed by remaining vertical line, weak links with reduced breaking strengths are identified as a requirement for the modified gear.

Past entanglements provide evidence that weak links are a critical measure to sufficiently reduce the risk of entanglement of marine mammals, especially right whales. The placement of the weak links under this alternative is designed to provide key breaking points so that any North Atlantic right whale that does become entangled would be able to break free (by exerting enough force to break a weak link). For gillnet gear allowed to be set in a DAM zone, each net panel would be required to have a total of 5 weak links with a maximum breaking strength of 1,100 lbs (498.9 kg). One floatline weak link would be required to be placed at the center of the net panel and two weak links would be placed as close as possible to each of the bridle ends of the net panel. The remaining two weak links would be placed in the center of each of the up and down lines at either end of each panel.

To further mitigate the occurrence of serious injury and mortality to right whales that become entangled, all anchored gillnets are required to be securely anchored with the holding power of at least a 22 lb (9.9 kg) Danforth-style anchor at each end of the net string. Anchoring provides resistance so that, if a whale encounters the anchored gear, sufficient tension is placed on the line, which is then likely to break at the weak links once the whale exerts enough force, thus resulting in the whale either entirely breaking free of the gear or swimming away with only a portion of line or gear rather than exacerbating the initial entanglement. When a portion of the gear remains attached to the whale in this manner, rather than being wrapped around the whale's body, it can be shed by the whale or may be removed through subsequent disentanglement efforts. Alternatively, if a North Atlantic right whale encounters gear that does not have weak

links and is not properly anchored, then any effort by the whale to free itself of the gear is likely to result in the animal increasing the severity of the entanglement.

In order to evaluate the effectiveness of weak links placed in the float line of gillnets, NMFS conducted investigations simulating an entanglement. NMFS placed strain on fifteen net strings that were anchored and twenty that were not anchored. Trials were run with both 600 lb (272.2 kg) and 1,100 lb (498.9 kg) weak links at three places on the floatline. When strain was applied to the gillnets with proper anchoring systems, the floatline weak line broke with very little net attached. This provides evidence that the weak links can be expected to break when encountering strain such as that placed on them by a marine mammal. The fact that the weak link broke quickly and cleanly provides evidence that an encounter between a North Atlantic right whale and gillnet gear with proper anchoring and the five weak links would sufficiently reduce the risk of entanglement to North Atlantic right whales. It is also important to note that recently a float has been designed and developed that incorporates a weak link, thus allowing fishermen to place weak links in gillnet gear more easily.

In 1997, a study was conducted by the Department of Fisheries, University of Rhode Island, to estimate the tractive force of the North Atlantic right whale. Maximum propulsive force (forward moving burst force) estimates for the North Atlantic right whale ranged from 465 lbs (210.9 kg) for 13 foot (3.9 m) whales to 9,440 lb (4,281.9 kg) for 59 foot whales. Maximum estimates of tractive forces for right whales ranged from 135 lb (61.2 kg) for 13 foot (3.9 m) whales to 6,969 lb (3,161 kg) for 59 foot (17.9 m) whales. Data on objects towed by right whales during rescue operations were also analyzed to determine forces capable of being generated by right whales. During the disentanglement of a 43 foot (13.1 m), 38.6 ton right whale, the Center for Coastal Studies attempted to fatigue the whale by adding an 8-foot (2.4 m) sea anchor, five Norwegian balls, and an inflatable boat. A 42 foot (12.8 m) fishing vessel was also tied to the whale. The vessel and gear were towed by the whale for one hour at a speed of nine knots. The total estimated drag on the whale during this operation ranged from 593 lb to 2,369 lb (268.9 kg to 1,074.6 kg). In addition, during the rescue the whale parted a rope with an estimated breaking strength of 400 lb (181.44 kg). The size of animals in the Bay of Fundy are likely to reflect the size of animals that could trigger a DAM. Seventy-seven animals observed and measured in the Bay of Fundy in 2000 and 2001 ranged in size between 25 to 50 feet (7.5 to 15 m). Of these 77 animals, 86 percent were greater than 33 feet (10 m). Based on this information, it would appear that most right whales that could trigger a DAM zone would be able to exert enough force on the 1,100 lb weak links to break them and thus become free of the gear.

In July 2001, a North Atlantic right whale was observed entangled in offshore lobster gear. The gear investigation determined that the entanglement was in the surface system (consisting of the buoy(s) and high flyer). Weak links were required in the portions of the gear where the entanglement occurred and, based on the gear remaining in the water and what was removed from the whale during disentanglement, it was determined that the weak link had functioned properly and had released the whale from the lobster pots. Based on the gear investigation, it was determined that the weak link allowed the North Atlantic right whale to break away from the majority of the offshore lobster gear, ending up with only a small piece of the line. The whale was completely disentangled by the Center for Coastal Studies except for a short piece of line lodged in the baleen, which was not considered harmful. NMFS concludes that, based on the weak link studies and review of gear configurations involved in entanglements, the additional weak links and lowered breaking strengths in the surface system identified for the DAM program would have allowed the North Atlantic right whale to free itself of all gear.

The concept of removing floating line from groundlines and buoy lines and the increased use of weak links was supported in discussions with the ALWTRT at its June 27-28, 2001, meeting and in public comments received on the SAM ANPR. The ALWTRT membership includes environmental interests, fishermen, gear experts, state and federal fisheries managers and large whale biologists who are considered experts in their respective fields. This group, as evidenced by the extensive development of additional gear modifications at the June 27-28, 2001, ALWTRT meeting, generally supports gear modifications as an alternative to complete closures.

Level II or Low Risk Gear was proposed as a requirement within a SAM area. A definition developed by a subgroup of the ALWTRT states that Level II or Low Risk Gear is gear for which any entanglement would be minor, meaning where death or serious injury is highly unlikely. NMFS concluded that the gear meeting this definition should be required to fish in SAM areas during the specified times.

The information and analysis provided in this document demonstrates that the gear modifications identified under this alternative for DAM sufficiently reduce the risk of entanglement to right whales by reducing the profile of line suspended in the water column and requiring the use of weak links with reduced breaking strengths. However, as indicated earlier in this section, the benefits realized from requiring one buoy line in a DAM zone may not be as great as NMFS assumed in the draft EA. Requiring one buoy line may result in fishermen electing to set fewer traps or nets per buoy line by splitting trap trawls and net strings into shorter sets. As a result, there may be more vertical lines in the water as well as more ghost

gear, both of which may actually increase the risk of entanglement to right whales.

The effectiveness of DAM, in general, and the NPA 1 gear modifications as an alternative management measure for protecting right whales within a DAM zone depends in part on the minimization of delays in achieving a reduction in the profile of line suspended in the water column. Delays may be caused by the time between the formation of a concentration of right whales, the observation of that concentration, the time required to prepare and file a Federal Register notice implementing restrictions, and the time period allowed for compliance with the restrictions. If a DAM zone is triggered and the NPA 1 gear modifications are required, the time necessary for compliance may be reduced if lobster trap and anchored gillnet fishermen have already changed their gear over to comply with the SAM time/area restrictions. Furthermore, lobster trap and anchored gillnet fishermen that fish both inside and outside the SAM areas may prefer to change all of their gear over in order to be prepared should a DAM be triggered in the waters where their gear is set. Efforts such as these would minimize the time delays in complying with gear modification requirements in a DAM zone and have the overall benefit of reducing the risk of entanglement to right whales.

# 5.1.2 Economic Impacts

Under the NPA 1 plan, vessels fishing lobster or sink gillnet gear must modify their gear to continue fishing in the DAM area. A sighting of 3 right whales at a density of 0.04 right whales per square nautical mile, will trigger a closure to all lobster trap and sink gillnet gear. Under the NPA 1 plan, a vessel can continue to fish in the DAM area if they convert to low entanglement risk gear. Based on analysis of sightings data from 2000, Clapham and Pace (2000) predicted closures would have been induced 6 times. Four of these six closures are subsumed under Seasonal Area Management (SAM) and one closure is in Canadian waters. Economic impacts are assessed for one DAM closure under this proposed action. Specifically, the one DAM closure occurs from June 20 to July 6, 2000 (Clapham and Pace, 2000).

Several potential scenarios exist as to how the fishing industry may adapt to this alternative. The scenarios include: 1) convert to gear consistent with NPA 1 gear modifications and continue fishing in DAM; 2) choose not to fish or convert gear; or 3) fish outside of the DAM area, do not convert gear, and move gear back into DAM when it reopens. In scenario 1, vessel profits or revenues will be reduced as a result of incurring the cost of converting to NPA 1 gear. Under scenario 2, vessels will incur the cost of removing and resetting their gear in DAM, plus forgone revenues from not fishing. Under scenario 3, a vessel may increase or decrease their revenue depending on the catch rates outside of DAM. For example, if the catch rates

are greater outside of DAM, we expect there to be revenue gains. It is more likely that vessels fish in areas that maximize their profits and therefore catch rates would be equal or less outside of DAM. Vessels will incur the differences in revenue between fishing inside and outside of DAM, plus the cost of removing their gear from DAM and then resetting it back in DAM when it opens. In the last two scenarios, vessels take on the risk of losing their fishing territory in DAM to another vessel.

A DAM area can be triggered anywhere and at any time outside of SAM areas and the Cape Cod Bay Critical Habitat (CCBCH) and Great South Channel Critical Habitat (GSCCH) restrictive time periods. This final rule is an incentive based program. If vessels convert their gear and a DAM is triggered within their fishing area they will not have to remove their gear. For analytical purposes we can assess the cost of converting the gear that is being fished within the DAM area only. However, vessels that fish in a DAM area are likely to have gear fishing elsewhere. As an alternative analytical approach, a vessel could choose to convert all their gear to low entanglement risk gear since it is all subject to future and potential DAM closures. In this EA we analyze the second approach. That is, a vessel fishing in the DAM zone will choose to convert all their gear.

The economic analysis of the NPA 1 plan is divided into three sections. Section 5.1.2.1 and 5.1.2.2 investigates the consequences of scenario 1 for the lobster and sink gillnet fleet, respectively. The results of the first two sections under scenario 1 are then summarized in Section 5.1.2.3. This summary section then ends with a discussion of scenario 2 and 3 as identified above.

# 5.1.2.1 Lobster Fleet

In this section we present the economic impacts of a DAM zone on the lobster fleet. To continue fishing in this area a vessel must convert its gear. We start this section by presenting the method of a break even analysis. The break even analysis is used to determine whether a vessel can incur these gear conversion costs and continue to fish and earn profits. Next we estimate the material and labor cost of converting gear for the average vessel. The economic impact of DAM on the lobster fleet is evaluated next. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable and fixed vessel expenses and we end with a break even analysis results.

### Method of Break-Even Analysis

In a break even analysis, the break even quantity identifies how many pounds of lobster a vessel must land before the vessel begins to earn profits. A break even analysis takes into consideration the price per pound of lobster received at the dock (P), the variable cost per pound

of lobster (VC) and total fixed costs the vessels incurs within a year (FC). Formally, the break even quantity  $Q_{\text{BE}}$  equation is:

$$Q_{BE} = \frac{FC}{P - VC}$$

Total fixed costs were based on the lobster vessel survey data by Gates (1995). The price per pound of lobster is calculated from recorded landings in the 2000 Dealer data. Finally, the variable cost per unit is equal to total variable expenses (Gates, 1995) divided by annual lobster landings per vessel.

The approach is to first examine the break even quantity without the proposed action. Next, the lower bound cost of converting the existing gear to NPA 1 gear is added to the fixed expenses, and the break even quantity is recalculated. The break even quantity is calculated once more using the upper bound cost of the gear conversion. Finally, we examine how the profitability and the break even quantity for an average vessel is altered under the proposed action, and then determine whether the vessel can absorb these extra costs.

# Gear Conversion Costs

Under the NPA 1 plan, lobster gear requires: 1) the use of neutrally buoyant or sinking line on all ground and buoy lines; 2) only 1 buoy line; 3) a weak link (WL) with a breaking strength of 1,500 pounds (a breaking strength of 600 lb is required for Inshore and Nearshore areas identified in Section 3.1) on the high flyer and the buoy ball; and 4) a weak link with a breaking strength of 3,780 pounds<sup>2</sup> just below the water surface.

#### Data

The following data sources were used: 1) Bisack (2000) estimates lower and upper bound numbers of lobster traps fished by area; 2) the NEFSC Gear Specialist (NMFS, pers. comm.) provided unit material costs for the gear and labor time required to convert to low risk entanglement gear; and 3) the U.S. Bureau of Labor Statistics provided hourly manufacturing labor rates as a labor rate for modifying gear. Data used in this analysis can be found in Table 5.1.2.1.

<sup>&</sup>lt;sup>2</sup> During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively. However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas. Therefore, the analysis of costs incurred is likely to be overestimated.

Table 5.1.2.1

General lobster gear information with unit material and labor costs to estimate the cost of converting to NPA 1 gear.

	Variable Name	N.Nearshore		N.Offshore	
Gear Information		(Class I and II)		Class III	
		LB	UB	LB	UB
Number of Traps	NT	266	800	854	1800
Number of Trawls	NTR	17.7	53.3	21.4	45
Length of Line Between	LLBT	120	120	180	180
Traps					
Depth of Water	DOW	177	177	419	419
Material Costs	Variable Name	\$/unit			
1500 lb Weak Link	WL				
1/4" Polyester		0.073			
Rope (3 feet)		0 50			
Plastic Swivel	MD	2.50			
Neutrally Buoyant Line	NB				
(At 1 foot)					
Nearshore -		0.06			
3/8"					
Offshore -		0.211			
5/8"					
	Variable				
Labor Costs	Name				
Time to Measure 100'	TTM	2 min.			
Attach a Weak Link	TAWL	10			
		min.			
U.S.Bureau Labor Rate per	\$LR	\$14.05			
hour					

Data from the 2000 NEFSC Vessel Trip Reporting (VTR) logbook system were used to estimate the number of traps fished, which is considered a lower bound (Bisack, 2000). The VTR logbook has recorded fishing activity at the fishing trip level. An upper bound estimate would be the number of traps legally allowed. Vessels effected by DAM will be those fishing in the Northern and Southern Nearshore, Northern Inshore, and Offshore Lobster Waters. Vessels that fish offshore exclusively are allowed to fish 1800 traps and all other vessels have a maximum of 800 traps. Trawls are fished, where a trawl consists of several traps tied together on one line. We assume vessels in the nearshore areas fish 15 traps per trawl, and offshore vessels fish 40 traps per trawl.

The lower and upper bound estimate of trawls fished by Northern Nearshore Lobster Waters vessels is 17.7 and 53.3, respectively (Bisack, 2000).<sup>3</sup> The lower and upper bound estimate of trawls fished by Offshore Lobster Waters vessels is 21.4 and 45 trawls, respectively.

Under the NPA 1 plan, all ground and buoy lines must be replaced with a neutrally buoyant or sinking line. We assume vessels will use neutrally buoyant line over sinking line since it costs less per foot. Vessels fishing in the Offshore Lobster Waters use line that is 5/8" in diameter. Vessels currently use polypropylene. The cost of neutrally buoyant line is \$0.211 per foot, versus \$0.28 per foot for sinking line. Vessels in the Northern Nearshore or Inshore State Lobster Waters use 3/8" line at a cost of \$0.06 per foot of neutrally buoyant line.

There are two choices available for a weak link with a breaking strength of 1,500 pounds. One weak link choice is 1/4" polyester at \$0.073 for 3 feet. Alternatively, one may choose a plastic swivel at a unit cost of \$2.50.

Total gear conversion costs include materials and labor. According to the U.S. Bureau of Labor, a manufacturing position earns \$14.05 per hour. We assume it takes 2 minutes of labor to measure out 100 feet of line (TTM), and 10 minutes to attach a weak link (TAWL).

Method to estimate the cost to convert to NPA 1 gear

Gear conversion costs include the material and labor for replacing all ground and buoy lines with neutrally buoyant line and attaching two 1,500 lb breaking strength weak links. We assume vessels will choose neutrally buoyant line over sinking line since it is currently sold at a lower cost. In addition, neutrally buoyant line may have a longer life since it lies on the surface of the bottom and the fibers of the line will absorb less sediment compared to sinking line which lies beneath the bottom surface. There should be less wear on neutrally buoyant line operationally. A general method is presented here on how to calculate the material and labor costs of these 3 gear conversions.

 $<sup>^3</sup>$  Lobster vessels are divided into 3 length classes. Class I are vessels less than 35 feet, Class II are vessels between 36 and 49 feet, and Class III vessels are greater than 49 feet. Class I and Class II vessels fish primarily in northern nearshore vessels and Class III vessels primarily fish in northern offshore waters.

 $<sup>^{4}\,\,</sup>$  The cost of 5/8" polypropylene is approximately 13.5 cents a foot.

Material and labor cost of ground lines

Material cost of ground lines (MC(GL)) is the product of the number of trawls (NTR), number of traps (NT), the length of line between traps (LLBT), and the dollar price per unit (\$/unit). Labor cost of the ground lines (LC(GL)) is the product of the number of trawls (NTR), number of traps (NT), length of line between traps (LLBT), the time to measure 100 feet of line (TTM), and the hourly labor rate (\$LR). In equation form we have:

MC(GL) = NTR\*(NT\*LLBT\*\$/unit) LC(GL) = NTR\*(NT\*LLBT\*(TTM/60minutes/100 feet)\*\$LR)

Material and labor cost of buoy lines

Material cost of buoy lines (MC(BL)) is the product of the number of trawls (NTR), the depth of the water (DOW), slack for tides (Slack=1.5), and the dollar price per unit (\$/unit). Labor cost of the buoy lines (LC(BL)) is the product of the number of trawls (NTR), the depth of water times the slack, the time to measure 100 feet of line (TTM), and the hourly labor rate (\$LR). In equation form we have:

MC(BL) = NTR\*(DOW\*Slack\*\$/unit) LC(BL) = NTR\*(DOW\*Slack\*(TTM/60minutes/100 feet)\*\$LR)

Material and labor cost of weak links

The material cost of two weak links (MC(WL)) is the product of the number of trawls (NTR), two weak links (WL), and the dollar price per unit (\$/unit). We multiply the material cost by 50 percent since we assume vessels will use plastic swivels on half the gear and a ROABS on the remaining gear. Therefore the total material cost is the sum of the cost of plastic swivels and ROABS. Labor cost of the weak links (LC(WL)) is the product of the number of trawls (NTR), two weak links (WL), the time to attach a weak link (TAWL), and the hourly labor rate (\$LR). In equation form we have:

MC(WL) = NTR \* (2 WL \* \$ / unit) \* 0.5 of the gearLC(WL) = NTR \* (2 WL \* (TAWL / 60minutes) \* \$LR)

 $<sup>^{5}</sup>$  Each lobster trawl typically has one buoy line at the end of each trawl. We assume a vessel will detach one buoy line within normal fishing operations at no cost.

## Cost to convert to NPA 1 gear

The lower and upper bound cost per vessel to convert to NPA 1 gear in the Northern Nearshore Lobster Waters is \$2,493 and \$7,508, respectively (Table 5.1.2.2). In the Offshore Lobster Waters, the lower and upper bound cost per vessel is \$36,285 and \$76,298, respectively. The largest cost component is the material cost of replacing existing ground lines with neutrally buoyant line. In the Northern Nearshore Lobster Waters, material cost of neutrally buoyant ground line is 77 percent of the total cost and it consumes 90 percent of the total cost for the Offshore Lobster Waters vessels.

We assume a vessel will take a 3 year business loan to pay for the upfront material and labor costs of converting to NPA 1 gear. Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here. For a vessel fishing in the Northern Nearshore Lobster Waters, the lower bound gear conversion cost is \$2,493 (Table 5.1.2.2), and annual payments are \$944 with a total loan payment of \$2,833. With the upper bound cost of \$7,508, annual payments are \$2,843 with a total loan payment of \$8,530. For a vessel fishing in the Offshore Lobster Waters, the lower bound gear conversion cost is \$36,285, and annual payments are \$13,745 with a total loan payment of \$41,234. With the upper bound gear conversion cost of \$76,298, annual payments are \$28,902 with a total loan payment of \$86,707.

<sup>&</sup>lt;sup>6</sup> The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, pers. comm.). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

Table 5.1.2.2

Cost per vessel to convert to NPA 1 gear

Gear	Cost of	N.Nearsho	re (\$1)	N.Ofi	fshore
Change		(Class I	and II)	( 5	\$1)
				(Clas	s III)
		LB	UB	LB	UB
NB on BL	Material	282	849	2,833	5 <b>,</b> 957
	Labor	22	66	63	133
	Vessel Total	304	915	2,896	6,090
NB on GL	Material	1,912	5 <b>,</b> 757	32 <b>,</b> 511	68 <b>,</b> 364
	Labor	149	449	722	1,517
	Vessel Total	2,061	6,206	33,233	69,881
Weak Link	Material	45	137	56	116
	Labor	83	250	100	211
	Vessel Total	128	387	156	327
Grand	Vessel Total	2,493	7 <b>,</b> 508	36 <b>,</b> 285	76,298
Total					

# DAM

Estimate of the number of vessels

Data from aerial surveys in 2000 were used to retrospectively evaluate the application of the recommended DAM triggers. Based on the analysis of this data, six DAM zones would have been triggered in 2000. However, four of the six hypothetical DAM zones would have been subsumed under the Seasonal Area Management (SAM) program, and another DAM would have occurred within Canadian waters, which are outside of United States jurisdiction. Therefore, the impacts were assessed with respect to one hypothetical DAM zone from June 20 to July 6. lower and upper bound estimate of vessels fishing lobster gear in the DAM area from June 20 to July 6 is 7 and 29, respectively. In addition, data from NEFSC's 2000 Vessel Trip Report (VTR) logbook were used. According to these data, a total of 183 vessels had recorded fishing activity in the Northern Nearshore and Offshore Lobster Waters. DAM falls within these two management areas. Of these 183 vessels, 3.8 percent (7 vessels) had recorded fishing activity in the DAM area.

The upper bound estimate of vessels fishing in DAM is 29 vessels. Using Bisack (2000) approximately 172 vessels potentially fish in the Offshore Lobster Waters and 677 vessels potentially fish in the Northern Nearshore Lobster Waters. According to the VTR, approximately 3.8 percent of the vessels fish in DAM. Therefore, the upper bound estimate of vessels fishing in DAM is 29 (=0.038\*(172+677)). For this analysis we will assume the number of vessels fishing in DAM is 29 from June 20 to July 6.

Forty three percent of the vessels (3 vessels) were Class I and the remaining 57 percent were in Class II. Although the larger Class II vessels have the capability of fishing offshore, their fishing records show activity in the Northern Nearshore and Offshore Lobster Waters. Lobster Management Area (LMA)1 and the Off Cape Area (OCA) are a subset of the Northern Nearshore Lobster Waters. These vessels had fishing activity in LMA 1, OCA and offshore (LMA 3), with a the majority of fishing occurring in nearshore and inshore waters. Therefore, all 13 vessels (13=29\*0.43) in length Class I and 16 vessels (16=29\*0.57) in length Class II are allowed a legal maximum of 800 traps. We assume vessels fishing in this area fish 15 traps per trawl. Using Bisack (2000), the lower and upper bound estimate of the number of trawls fished are 17.7 and 53.3, respectively (Table 5.1.2.1).

#### Revenues

According to the 2000 VTR, Class I vessels fished 79 days (CV=0.69), earned \$59,700 (CV=0.49) in revenues and landed 14,900 pounds of lobster per year. In contrast, Class II vessels fished 80.8 days (CV=0.41), earned \$152,600 (CV=0.26) in revenues by landings 38,100 pounds of lobster per year.

# Variable and Fixed Vessel Expenses

In Gates analysis (1995), Class I vessels were 33 feet in length and fished 159 days per year. According to the VTR, there were 3 Class I vessels fishing in DAM fished 79 days (CV=0.69) per year. Variable expenses and some fixed expenses such as insurance, interest and loans and property taxes were prorated from 159 days to 79 days. A 2000 producer price index was then applied to the 1995 prorated cost estimates. Finally, annual variable expenses for Class I vessels are\$17,478 and annual fixed expenses are \$10,885, for a total of \$28,363 (Table 5.1.2.3).

<sup>&</sup>lt;sup>7</sup> Based on the annual days at sea, these vessels appear to be part-time versus full-time fishing vessels. Variable and some fixed expenses are therefore scaled according to their time at sea, since we would not expect a part-time fisher to be as invested in fixed costs such as property taxes compared to a full-time fishing vessel.

Table 5.1.2.3. Variable and Fixed Expenses for DAM Class I lobster vessels

	Year
Variable Expenses	2000
Boat Repair and Maintenance - By Yard	434
Boat Repair and Maintenance - By	1,139
Owner	
Supplies (Store)	744
Food	330
Gear Maintenance (Normal Use)	1,488
Fuel and Lubricants	1,496
Bait	4,360
Vehicles	1,170
Sternman Payment Total	6,318 \$17,478
IOCAL	γ1/ <b>,</b> 4/0
Fixed Expenses	2000
Licence and Permits	208
Mooring & Docking Fees	989
Interest on Loans (Operating)	1,009
Interest on Loans (Long Term)	2 <b>,</b> 639
Insurance (Boat)	828 388
Insurance (Sternman) Property Taxes	440
Losses of Gear and Equipment	2 <b>,</b> 872
Fixed Cost on Shore front Property	1,510
Total	\$10,885

Gates analysis (1995) of Class II vessels had an average length 40 feet and fished 166 days per year on average. According to the VTR, the 5 Class II vessels fishing in DAM, were 39 feet in length and fished 80.8 day per year on average. Annual variable and fixed vessel expenses were prorated from 166 days to 80.8 days. In 2000, annual variable expenses for these Class II vessels were \$26,277 and annual fixed expenses were \$8,848 for a total of \$35,125 (Table 5.1.2.4). These vessels typically fish with 1 to 2 crew members including the captain.

 $<sup>^{8}\,\</sup>mathrm{A}$  scale adjustment for variable and some fixed costs are also made for these Class II vessels, as applied above with the Class I lobster vessels.

Table 5.1.2.4. Variable and Fixed Expenses for DAM Class II lobster vessels.

Maniah la European	Year
Variable Expenses	2000
Boat Repair and Maintenance - By Yard	
Boat Repair and Maintenance - By	1 <b>,</b> 528
Owner (Store)	1 222
Supplies (Store) Food	1,233 593
Gear Maintenance (Normal Use)	1,779
Fuel and Lubricants	2,612
Bait	4,389
Vehicles	1,455
Sternman Payment	12,208
Total	\$26 <b>,</b> 277
Fixed Expenses	2000
Licence and Permits	161
Mooring & Docking Fees	1,638
Interest on Loans (Operating)	636
Interest on Loans (Long Term) Insurance (Boat)	1,432 1,044
Insurance (Sternman)	318
Property Taxes	2,993
Losses of Gear and Equipment	312
Fixed Cost on Shore front Property	
Total	\$8 <b>,</b> 848

Results of a Break Even analysis of the NPA 1 within DAM Class I lobster vessels

Without the NPA 1 plan, Class I lobster vessels have a break even quantity of 3,848 pounds of lobster, which is 26 percent of their annual landings (Table 5.1.2.5). That is, they start to earn a profit when they land more than 3,848 pounds. Business decisions involving gear conversions are based on an annual time frame versus a seasonal time frame. The break even quantity increases by 9 percent and 26 percent for the lower and upper bound gear conversion cost. At the upper bound, the break even quantity is 33 percent of annual landings, compared to 26 percent without the regulation.

These length Class I vessels earn annual profits of \$31,337\$ and land 14,900 pounds of lobster per year on average (Table 5.1.2.5). If a Class I lobster vessel incurred the lower or upper bound cost of converting to NPA 1 gear, annual profits would decrease by 3.0 percent

and 9.0 percent, respectively. The annual payment of the upper bound gear conversion cost is \$2,833. Based on this analysis, if these Class I DAM lobster vessels incur the upper bound cost of converting their gear they may continue to fish and earn profits.

Table 5.1.2.5.

Break Even analysis of DAM Class I lobster vessels (NPA 1)

BE Componen ts	Unit	Before	NP	A 1
		Regulation	LB	UB
Price VC/unit Fixed (FC) BE Units	\$ \$ \$ pounds	1.17 10,885 3,848	4 1.17 11,829 4,182	
	Percent Increase (+9%)			(+26%)
		Revenue and	l Lobster	Landings
		Annual		
Revenue Cost	\$ \$	59,700 28,363		
Profits	\$	31,337		
Profit % Reductio	LB	3.0%		
n	UB	9.0%		
Landings	pounds	15,000		

# Class II lobster vessels

Without the NPA 1 plan, Class II vessels have a break even quantity of 2,672 pounds of lobster, which is 7 percent of their annual landings (Table 5.1.2.6). We assume these vessels make business decisions about gear conversions based on an annual time frame versus a seasonal time frame. The break even quantity would increase by 10.7 percent and 32.1 percent for the lower and upper bound gear conversion cost. At the upper bound, the break even quantity is 9 percent of annual landings, compared to 7 percent without the regulation.

Vessels earned annual profits of \$117,475 and land 38,100 pounds of lobster per year on average (Table 5.1.2.6). If a Class II vessel incurred the lower and upper bound cost of converting to NPA 1 gear, annual profits would decrease by 0.8 percent and 2.4 percent, respectively. This profit reduction is based on a one year versus 3 year term loan payment. If vessels incur the upper bound cost of converting their gear they may continue to fish and earn profits.

 $\mbox{Table 5.1.2.6.} \\ \mbox{Break Even analysis of DAM Class II lobster vessels (NPA 1)}$ 

BE						
Components	Unit	Before	NP <i>I</i>	. 1		
		Regulation	LB	UB		
Price	\$	4	4	4		
VC/unit	\$	0.69	0.69	0.69		
Fixed (FC)	\$	8,848	9 <b>,</b> 792	11,691		
BE Units	pounds	2,672	2 <b>,</b> 957	3,531		
Perce	nt Inc	rease	(+10.7%)	(+32.1%)		
		Revenue an	d Lobster	Landings		
				,		
		Annual				
Revenue	\$	152 <b>,</b> 600				
Cost	\$	35 <b>,</b> 125				
Profits	\$	117,475				
Profit %	LB	0.8%				
Reduction	UB	2.4%				
Landings	pounds	38,100				

# 5.1.2.2 Sink Gillnet Fleet

In this section we present the economic impacts of one DAM zone on the sink gillnet fleet. To continue fishing in these areas a vessel must convert its gear. We start this section by presenting a method to determine a vessel's profits. We then estimate how much profits will change under this regulation. The change in profits under this regulation is a function of the material and labor cost of converting gear for the average vessel, which is presented next. The economic impact of DAM on the sink gillnet fleet follows. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable and fixed vessel expenses and we end with the results of a vessel profit analysis.

# Method of estimating vessel profits

Vessel profits are based on the layman system, which is used here. Under the sink gillnet fishery layman's system, trip operating costs are removed from trip revenues first. Then 50 percent of the remaining revenues are paid to the captain and crew for labor. The split between members on the vessel depends on level of experience. The remaining revenues (50 percent) are paid to the boat. Annual profits are equal to annual revenues minus variable and fixed expenses, times fifty percent. Next we determine whether a vessel can absorb the cost of converting to NPA 1 gear, by evaluating the change in profits as a result of this proposed regulation.

#### Gear Conversion Costs

Converting sink gillnet gear under the NPA 1 plan requires: 1) the use of neutrally buoyant or sinking line on all ground, buoy and anchor lines; 2) only 1 buoy line; 3) a weak link (WL) with a breaking strength of 1,100 pounds on the high flyer and the buoy ball; 4) 5 weak links of 1,100 lb breaking strength on each net panel; 5) a weak link with a breaking strength of 3,780 pounds just below the water surface; and 6) a anchor with holding power of at least a 22 pound Danforth-style anchor or greater at the end of each sink gillnet string.

# Data

The following data sources were used: 1) Bisack (2000) provides estimates of the number of sink gillnet vessels and quantity of gear fished by area; 2) the NEFSC Gear Specialist (NMFS, pers. comm.) provided unit material costs for the gear and labor time required to convert to low entanglement risk gear; and 3) the U.S. Bureau of Labor Statistics provided hourly manufacturing labor rates. Data used in this analysis can be found in Table 5.1.2.7.

NEFSC observer data were used to estimate the quantity of gear fished, and NEFSC Vessel Trip Reporting (VTR) logbook and Dealer data were used to estimate the number of sink gillnet vessels fishing by area in Bisack (2000). In the northern nearshore area, sink gillnet vessels fish 10.3 net panels per string and 4.8 strings per trip on average (Table 5.1.2.7). In the northern offshore area, sink gillnet vessels fish 18.4 net panels per string and 10.7 strings per trip.

<sup>&</sup>lt;sup>9</sup> During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively. However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas. Therefore, the analysis of costs incurred is likely to be overestimated.

<sup>&</sup>lt;sup>10</sup> Sink gillnet vessels are divided into 2 length classes. Class I are vessels less than 40 feet and Class II sink gillnet vessels are 40 feet and greater. Typically vessels fishing in the northern nearshore waters are Class I vessels, and vessels fishing in the northern offshore area are Class II vessels.

Table 5.1.2.7

General sink gillnet gear information and unit material and labor costs to estimate the cost of converting to NPA 1.

Gear Information	Variable Name	N.Nearshore (Class I)	N.Offshore (Class II)
Number of Strings Number of Net Panels Height of Net Panel Depth of Water Length of Anchor Line	NS NNP HNP DOW LAL	177 feet	10.7 18.4 10 feet 419 feet 100 feet
Material Costs	Variable Name	\$/unit	
1100 lb Weak Link 1/4" Polyester Rope (3feet) 3780 lb Weak Link 7/16" polypropylene (3feet) Breakaway Float on panel Neutrally Buoyant Line (@ 1 foot) Nearshore - 3/8" Offshore - 5/8"	WL	0.073 1.00 3.00 0.04 0.06 0.211	
Labor Costs	Variable Name		
Time to Measure 100' Attach a Weak Link U.S.Bureau Labor Rate	TTM TAWL \$LR	2 min. 10 min. \$14.05/hr	

Method to estimate the cost to convert to NPA 1 gear

Gear conversion costs include the material and labor for replacing lines with neutrally buoyant line and attaching weak links. Based on observed sink gillnet trips, vessels currently use anchors with holding powers of at least a 22 lb Danforth-style anchor or more and, therefore, this is a no cost item. We assume vessels choose neutrally buoyant line over sinking line since it is currently sold at a lower cost. A general method is presented here on how to calculate the material and labor costs of these gear conversions.

Material and labor cost of ground and anchor lines

The ground line runs from the end net panel to the anchor line. The length of the anchor line is approximately 100 feet. The ground line

to the anchor line is the height of the net panel, which is 10 feet on average times a slack factor of 1.5. Therefore, at the end of each string, one anchor and ground line is 115 feet.

Material cost of ground and anchor lines (MC(AGL)) is the product of the number of strings (NS), two string ends (SE), the length of anchor and ground line (AGL), and the dollar price per unit (\$/unit). Labor cost of the anchor and ground lines (LC(AGL)) is the product of the number of strings (NS), the length of the anchor and ground line (AGL), the time to measure 100 feet of line (TTM) plus 2 minutes to attach, and the hourly labor rate (\$LR). In equation form we have:

MC(AGL) = NS\*2 SE\*AGL\*\$/unitLC(AGL) = NS\*2 SE\*AGL\*((TTM/60minutes/100 feet) + 2/60)\*\$LR

Material and labor cost of buoy lines

Material cost of buoy lines (MC(BL)) is the product of the number of strings (NS), the depth of the water (DOW), slack for tides (Slack=1.5), and the dollar price per unit (\$/unit). Labor cost of the buoy lines (LC(BL)) is the product of the number of strings (NS), the depth of water times the slack, the time to measure 100 feet of line (TTM), and the hourly labor rate (\$LR). In equation form we have:

MC(BL) = NS\*DOW\*Slack\*\$/unit)
LC(BL) = NS\*(DOW\*Slack\*(TTM/60minutes/100 feet)\*\$LR)

Material and labor cost of 1,100 pound weak links

Five 1,100 pound weak links are required on each net panel. In the 2000 gear regulation, one 1,100 pound weak link was required on each net panel. Therefore, under this proposed alternative, four 1,100 weak links must be added. In addition, one 1,100 pound weak links is required on the high flyer and one on the buoy ball. In the 2000 gear regulation, one 1,100 pound weak link was required on the buoy line. Therefore only one 1,100 weak link is required on the buoy line under this alternative.

The number of 1,100 pound weak links per string (WLS) is equal to 1 weak link at the buoy line per string (WL at BL) plus 4 weak links times the number of net panels per string (4 WL \*NNP). The material cost of 1,100 pound weak links (MC(WL)) is then equal to the number of strings fished per trip (NS) times the number of weak links per string (WLS), and the dollar price per unit (\$/unit). Labor cost of the weak links (LC(WL)) is the product of the number of strings (NS), the number of weak links per string (WLS), the time to attach a weak link (TAWL), and the hourly labor rate (\$LR). In equation form we have:

WLS = 1 WL at BL + 4 WL \* NNP)

MC(WL) = NS \* WLS \* \$ / unit

LC(WL) = NS \* WLS \* (TAWL / 60minutes) \* \$LR

There are two types of 1,100 pound weak links. One type of weak link is a 1/4" polyester rope which can be spliced in for a total cost of 7.3 cents per 3 foot weak link. As an alternative, Eric Dedoes of Somerville, Maine designed a small, melon sized football-shaped float that breaks away easily if a whale becomes entangled in a fishing net. The device is called a break-away float. If the break-away floats are available, the unit cost would be \$3.

Cost to convert to NPA 1 gear

The cost per vessel to convert to NPA 1 gear in the northern nearshore area and northern offshore area is \$779 and \$4,085, respectively (Table 5.1.2.8). For the nearshore vessels, the cost of installing 1,100 pound weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link is \$489, \$82, \$196, and \$11, totaling \$779. Similarly, it costs \$1,927, \$1,450, \$681, and \$25 to install 1,100 pound weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link<sup>11</sup>, respectively. The largest cost component for both vessel types is the 1,100 pound weak links. If the break-away floats are available, the total cost per vessel for a nearshore vessel and offshore vessel is \$1,357 and \$6,389, respectively (Table 5.1.2.8).

During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively. However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas. Therefore, the analysis of costs incurred is likely to be overestimated.

Table 5.1.2.8

Total cost of converting to NPA 1 gear per sink gillnet vessel.

Gear Item	Gear Change	Cost Type	N.Nearshore (\$1) (Class I)	N.Offshore (\$1) (Class II)
	1100 lb WL on Net Panels, High Flyer and Ball	NWL per string Material Labor Vessel Total	42.2 14.79 474.33 489.12	74.6 58.27 1,869.17 1,927.44
2	NB Buoy Line	Material Labor Vessel Total	76.49 5.97 82.46	1,418.96 31.50 1,450.46
3	NB on Anchor & Ground Line	Material Labor Vessel Total	66.24 130.21 196.45	519.27 161.86 681.13
	3780 lb WL on Buoy Line	Material Labor Vessel Total	0.19 11.24 11.43	0.43 25.06 25.49
Grand	Total (1-4)	Vessel Total	779	4,085
5	Breakaway Float	Material Labor Vessel Total	593 474 1,067	2,363 1,869 4,232
Grand	Total (2-5)	Vessel Total	1,357	6 <b>,</b> 389

We assume a vessel will take a 3 year business loan to pay for the upfront material and labor costs of converting to NPA 1 gear. 12 Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here. For a Class I vessel, the lower bound gear conversion cost is \$799 (Table 5.1.2.8), and annual payments are \$295 with a total loan payment of \$885. With the upper bound cost of

<sup>&</sup>lt;sup>12</sup> The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, pers. comm.). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

\$1,358, annual payments are \$514 with a total loan payment of \$1,543. For a Class II vessel fishing in the offshore area, the lower bound gear conversion cost is \$4,642, and annual payments are \$1,547 with a total loan payment of \$4,642. With the upper bound gear conversion cost of \$6,389, annual payments are \$2,420 with a total loan payment of \$7,261.

## DAM

Estimate of the number of vessels

According to the 2000 VTR there were 16 sink gillnet vessels fishing in the DAM closure from June 20 to July 6, 2000. Of these 16 vessels, 4 vessels were less than 40 feet (Class I) in length with an average of 39 feet (CV=0.04), and 12 vessels were greater than 40 feet in length (Class II) with an average of 44.6 feet (CV=0.07).

#### Revenues

According to the 2000 VTR logbook, annual revenues for Class I vessels were \$162,200 (CV=0.52) and they landed 113,100 (CV=0.57) pounds of multi-species fish per year. Class II vessels earned annual revenues of \$288,100 (CV=0.43) and landed 256,500 (CV=0.55) pounds of multi-species fish per year.

Variable and Fixed Vessel Expenses

Total variable expenses for a Class I vessel were \$8,900 (CV=0.42) per year. This includes the cost of fuel, ice, water, food, bait and oil. 1996 to 2001 NEFSC observer data were used to develop this estimate which is based on a cost per days absent from port. These four vessels were absent \$6.3 (CV=0.33) days per year on average.

Fixed expenses include the replacement cost of lost gear, annual gear replacement such as the panel webbing, license and docking fees. We assume sink vessels under 40 feet in length incur expense of \$1,197 (=\$208+\$989) for licenses, permits, mooring and docking fees similar to lobster vessels less than 35 feet in length (Table 5.1.2.3). Given a vessel losses one string of sink gillnet gear per year, the replacement cost is \$1,985 and it costs \$2,225 to replace the panel webbing annually for a total of \$4,210 (Table 5.1.2.9). Annual fixed costs are therefore \$5,407. Annual variable and fixed vessel expenses for a Class I sink gillnet vessel is \$14,300 on average.

<sup>&</sup>lt;sup>13</sup> This estimate is considered downwardly biased since it does not include interest and loan payments, insurance, property taxes or fixed costs for shore front property.

Table 5.1.2.9

Annual cost of replacing webbing in net panels and replacing 1 string for the average sink gillnet vessel

IOI the average Sink	grrrice vess	C 1
Gear Descriptions	N.Nearshore (\$1) (Class I)	(\$1) (Class II)
Annual cost of replacing webbing	2,225	8,860
Replacement of 1 string Anchors - 2 danforth	134	134
High Flyer Flags - 2 Buoy Ball - 2 NB line on buoy line NB line on anchor line Headrope Leadline Webbing	110 14 16 12 515 721 463	110 14 133 42 920 1,288 828
Total	1,985	3 <b>,</b> 469
Annual gear replacement	4,210	12,329

Total variable expenses for a Class II vessel were \$14,400 (CV=0.37) per year. This includes the cost of fuel, ice, water, food, bait and oil. NEFSC observer data were used to develop this estimate which is based on a cost per days absent from port. These seven vessels were absent 119 (CV=0.22) days per year on average.

Fixed expenses include the replacement cost of lost gear, annual gear replacement such as the panel webbing, license and docking fees. We assume sink vessels greater than 40 feet in length incur expense of \$4,062 (=\$573+\$3,489) for licenses, permits, mooring and docking fees similar to lobster vessels greater than 50 feet in length. Given a vessel losses one string of sink gillnet gear per year, the replacement cost is \$3,469 and it costs \$8,860 to replace the panel webbing annually for a total of \$12,329 (Table 5.1.2.9). Annual fixed costs are therefore \$16,391.

 $<sup>^{14}</sup>$  This estimate is considered downwardly biased since it does not include interest and loan payments, insurance, property taxes or fixed costs for shore front property.

vessel expenses for a Class II sink gillnet vessel is \$30,800 on average.

Results of profit analysis

The average Class I sink gillnet vessel fishing in DAM earned a profit of \$73,950 per year without this regulation. Annual revenues were \$162,200 minus \$14,300 for variable and fixed vessels expenses, leaving a remaining revenue of \$147,900. Labor and profits are 50 percent each of the remaining revenues. Therefore annual vessel profits are \$73,950 (Table 5.1.2.10).

Revenue and	Groundfish	Landings
		Annual
Revenue	\$	162 <b>,</b> 200
Variable and	L \$	14,300
Fixed Costs		
Remaining	\$	147,900
Revenues		
Labor		73 <b>,</b> 950
Profits		73 <b>,</b> 950
Profit %	LB	(-0.4%)
Reduction	UB	(-0.7%)
Landings	pounds	113,100

If this regulation is imposed, profits will be reduced by less than 0.4 percent given a sink gillnet vessel converts to NPA 1 gear. This assumes the vessel uses a 1/4" polyester rope as the 1,100 pound weak link. Alternatively, if a vessel chooses to use the new break-away float, a vessel's profits will be reduced by 0.7 percent. It appears that a sink gillnet vessel under 40 feet can convert to NPA 1 gear, continue to fish and earn profits.

Class II sink gillnet vessels fishing in the DAM zone earned a profit of \$128,650 per year without this regulation. Annual revenues were \$256,500 minus \$30,800 for variable and fixed vessels expenses, leaving a remaining revenue of \$257,300. Labor and profits are 50 percent each of the remaining revenues. Therefore, annual vessel profits are \$128,650 (Table 5.1.2.11).

Table 5.1.2.11.

Break Even analysis of DAM Class II sink gillnet vessels (NPA 1)

Revenue and Gro	oundfish	Landings
		Annual
Revenue	\$	288,100
Variable and	\$	30,800
Fixed Costs		
Remaining	\$	257 <b>,</b> 300
Revenues		
Labor		128,650
Profits		128,650
Profit %	LB	(-1.2%)
Reduction	UB	(-1.9%)
Landings	pounds	256 <b>,</b> 500

Under the NPA 1 plan, profits will be reduced by less than 1.2 percent given a sink gillnet vessel converts to NPA 1 gear. This assumes the vessel uses a 1/4" polyester rope as the 1,100 pound weak link. Alternatively, if a vessel chooses to use the new break-away float, a vessel's profits will be reduced by 1.9 percent.

# 5.1.2.3 Summary of NPA 1

Three potential scenarios considered as to how the fishing industry may react to the NPA 1 plan include: 1) convert to NPA 1 gear and continue fishing in DAM; 2) do not convert to NPA 1 gear and choose not to fish during this time period; or 3) do not convert to NPA 1 gear, fish outside of the DAM area until it reopens and then move the gear back inside DAM. Each scenario will be discussed in this summary section.

Scenario 1: Vessels convert to NPA 1 gear. Vessels fishing both lobster and sink gillnet gear have been grouped by size classes. The annual cost of converting to NPA 1 gear ranges between a low of \$295 for a Class I sink gillnet vessel in DAM to a high of \$2,833 for a Class I or Class II lobster vessel (Table 5.1.2.12). In general, we assume vessels fishing lobster gear will take out a 3 year term loan at 8.5 percent to pay for the cost of converting their gear.

Under this scenario, annual profits are reduced by a maximum of 9 percent for a Class I lobster vessel and 2 percent for a Class II lobster vessel under the proposed action (Table 5.1.2.12).

#### Table 5.1.2.12

Summary of NPA 1 vessels, annual revenues, variable and fixed expenses and profits per vessels with out this regulation, annual gear payments and reduction of profits due this regulation (ie. gear conversion costs) per vessel by fleet and vessel length class.

	DAM					
		ster Class II		illnet Class II		
Vessel Length in Feet	< 35		< 40	> 40		
Number of Vessels	13	16	4	12		
Per Vessel Annual Revenues	59 <b>,</b> 700	152,600	162,200	256 <b>,</b> 500		
Variable and Fixed Expenses	28,400	35 <b>,</b> 100	14,300	30,800		
Profits w/out PA	31,300	117,500	73 <b>,</b> 950	128,650		
Annual Gear Loan Payment LB UB	944 2,833	_	295 514	, -		
Annual Profits Reduction LB UB	0.03	0.01	0.004 0.007	0.012 0.019		

Class I and Class II vessels fishing sink gillnet gear in the DAM closure should be able to incur the cost of converting to NPA 1 gear, continue to fish and earn profits. If vessels choose the 1/4" polyester rope, then profits for Class I and Class II sink gillnet vessels were reduced by 0.4 percent (LB) and 1.2 percent (LB), respectively. Profits for a Class I and Class II sink gillnet vessels were reduced by 0.7 percent (UB) and 1.9 percent (UB), respectively, if they choose to use the break-away float versus a 1/4" polyester rope as a 1,100 pound weak link (Table 5.1.2.12).

Finally, the total lower and upper bound industry gear conversion costs for 45 vessels in the lobster and sink gillnet fleet are \$47.1K and \$113.3K, respectively (Table 5.1.2.13). This estimate includes the annual loan payment a lobster and sink gillnet vessel will pay to convert to NPA 1 gear.

Table 5.1.2.13

Summary of NPA 1 vessels, annual loan payments, industry cost of converting gear and forgone revenues by fleet and vessel length class

	DAM					Grand Total
		Lobs	ster	Sink G	illnet	
		Class 1	Class II	Class I	Class II	
Vessel Lengt	h (Feet)	< 35	35 <l< 50<="" td=""><td>&lt; 40</td><td>&gt; 40</td><td></td></l<>	< 40	> 40	
Number of	Vessels	13	16	4	12	45
Annual Loan	Payment LB UB	944 2,833	944 2,833	295 514	1,547 2,420	
Indust	cry					
Total	LB UB	12,272 36,829	15,104 45,328	1,180 2,056	•	47,120 113,253

The total lower and upper bound industry costs for the lobster fleet are \$27.4K (=\$12,272 + \$15,104) and \$82.2K (=\$36,829 + \$45,328), respectively. Total lower and upper bound industry costs for the sink gillnet fleet are \$19.7K (=\$1,180+\$18,564) and \$31.1K (=\$2,056+\$29,040), respectively.

Scenario 2: As a second scenario, a vessel may choose not to convert to NPA 1 gear or fish. Vessels incur the cost of removing and resetting their gear in the water, plus forgone revenues. Based on the estimated profit reductions under scenario 1 of the NPA 1 plan, all vessels are likely to convert their gear. These vessels must weigh their loss in profits against the risk they take of losing fishing bottom to another vessel. That is, once gear is removed from an area, it is open for any other vessel to fish it given they comply with this regulation.

Scenario 3: In the third scenario, a vessel may choose not to convert to NPA 1 gear and fish outside of a DAM zone. In this case, the vessel's revenues would be influenced by the catch rates inside and outside of the closed area. If the catch rates are lower outside and there is bottom available to fish, vessel profits would be reduced. In addition, the vessel would incur the extra labor and fuel cost associated with moving and resetting their gear inside and outside of a DAM zone, plus they take the risk of losing their fishing territory in a DAM zone. Based on the estimated profit reductions under scenario 1 of the NPA 1 plan, all vessels are likely to convert their gear.

#### Conclusion:

Class I and Class II lobster vessels in the DAM zone are likely to choose scenario 1 since annual profits are reduced by a maximum of 9 percent. All sink gillnet vessels are likely to choose scenario 1 since annual profits are reduced by a maximum of 1.9 percent.

# 5.1.3 Social Impacts

Using the 2000 data to conduct a retrospective analysis, it appears that application of DAM in 2000 would have affected approximately 210 lobster vessels and 42 gillnet vessels in 6 areas that were affected for a total of 193 days. This analysis assumed that fishing effort in DAM Area 1 is uniformly distributed and is representative of fishing effort in the other 5 DAM areas. It is also important to note that these gear restrictions may be in addition to other closures and restrictions imposed under the Magnuson-Stevens Act. Restricting fishing in these areas may result in reduced employment if the result is that the vessels do not fish on the days that implementation of DAM has closed an area. Alternatively, a DAM zone in one area may shift fishing effort outside that area into adjacent areas. This effort shift may require more time away from family, friends and community as fishermen may need to travel further to reach fishing grounds not restricted. However, effort may be shifted inshore, perhaps closer to family, friends and community.

Social benefits may be realized if these gear modifications for DAM zones are effective at reducing the risk of entanglement to right whales, other marine mammals, and sea turtles. If this reduced risk increases the potential for recovery, then society will benefit by preventing a loss of a species and preserving biodiversity. While these DAM gear modifications place time and area restrictions on fishing practices, they do not prohibit fishing all together. Social benefits are realized from the application of management practices that demonstrate that fishing practices and marine mammals can coexist.

Additionally, if NMFS implements a DAM zone with NPA 1 gear modifications, fishermen who fish with SAM or similarly modified gear would be able to comply quicker to protect right whales then if they had to completely remove gear from the area. For example, fishermen that modify their gear to fish within the SAM area would be able to fish within a DAM zone if NMFS decided to implement NPA 1 gear modifications in the zone.

#### 5.2 NO ACTION

The No Action alternative would leave in place the existing regulations promulgated under the ALWTRP, but would not identify gear modifications that would allow lobster trap and anchored gillnet

fishing inside a DAM zone. Under the DAM program (67 FR 1133, January 9, 2002), once a DAM zone is triggered and defined, NMFS may: 1) require the removal of all lobster trap and anchored gillnet gear from the DAM zone within two days of publication in the Federal Register; 2) issue an alert to fishermen requesting the voluntary removal of all lobster trap and anchored gillnet gear for a 15-day period; and/or 3) allow fishing with lobster trap and anchored gillnet gear determined to sufficiently reduce the risk of entanglement to right whales. However, the current regulations do not identify fishing gear determined to sufficiently reduce the risk of entanglement to right whales under the DAM program. Therefore, the only management options available to NMFS under the current DAM program are either a complete closure or request for voluntary removal of lobster trap and anchored gillnet gear inside the DAM zone. So, if the No Action alternative is adopted, then the regulations would lack identified gear modifications that sufficiently reduce the risk of entanglement to right whales within DAM zones.

# 5.2.1 Biological Impacts

The DAM program, as it is currently implemented, only provides NMFS with the option of either closing a DAM zone to all lobster trap and anchored gillnet fishing for a 15-day period or issuing an alert to fishermen requesting the voluntary removal of all lobster trap and gillnet fishing gear for a 15-day period. NMFS reserved the authority to require gear modifications within DAM zones, but specified that such modifications would have to be identified in a future rulemaking, once NMFS determined which modifications would sufficiently reduce the risk of entanglement to right whales. The No Action alternative would prevent NMFS from identifying acceptable gear modifications, but would not have direct biological impacts. However, the No Action alternative may have indirect negative biological impacts if the lack of an option to fish modified gear in a DAM zone results in low compliance with regulations when closing a DAM zone to protect whales.

The efficacy of the DAM program depends to a great extent on whether NMFS is able to exercise the full range of management options that the agency intended to be available under the DAM program. The identification of gear modifications that sufficiently reduce the risk of entanglement to right whales is, therefore, important to achieving the DAM program NMFS envisioned during the development of this RPA component. Once gear modifications are identified and determined to reduce the risk of entanglement to right whales, NMFS will endeavor to educate the regulated community of those gear modifications and achieve compliance with any restrictions that are implemented. Completion of rulemaking to identify such gear modifications as an alternative management measure to implementing a DAM closure would have positive biological consequences for right whales if public participation results in greater compliance by fishermen with DAM

restrictions, including gear modifications. Such positive consequences may be foregone by choosing the No Action alternative.

# 5.2.2 Economic Impacts

A complete closure to lobster and sink gillnet gear exists when a DAM is implemented, under status quo. In the worst case scenario, a vessel would move their gear out of the DAM zone and choose not to fish and therefore incur revenue losses plus the cost of moving their gear. Based on analysis of sightings data from 2000, Clapham and Pace (2000) predicted DAM zones would have been induced 6 times. Four of these six DAM zones are subsumed under Seasonal Area Management (SAM) and one DAM zone is in Canadian waters. Economic impacts are assessed for one DAM zone under this proposed action. Specifically, the one DAM zone occurs from June 20 to July 6, 2000 (Clapham and Pace, 2000).

If a lobster vessel chose not to fish outside the closed DAM zone, annual revenues would be reduced by 5 percent if these 29 vessels chose not to fish from June 20 to July 6, 2002. Annual forgone revenues would be reduced by approximately 9 percent for a sink gillnet vessel if they also chose not to fish outside the closed DAM zone from June 20 to July 6, 2002.

Under status quo, total forgone industry revenues for the lobster and sink gillnet fleet under the worst case scenario are estimated at \$529.5K. Industry revenues for Class I and II vessels in the lobster fleet would be reduced by \$39.2K (=13 Class I vessels \*\$3.0K forgone revenues) and \$115.6K (=16 Class II vessels\*\$7.2K forgone revenues), respectively. Industry revenues for Class I and II vessels in the sink gillnet fleet would be reduced by \$54.1K (=4 Class I vessels \*\$13.5K forgone revenues) and \$320.6K (=12 Class II vessels\*\$26.7K forgone revenues), respectively.

# 5.2.3 Social Impacts

Under the No Action alternative, gear modifications are not identified and, therefore, impacts to employment, family and community are elevated by requiring either complete closures or requesting the voluntary removal of all lobster trap and anchored gillnet gear from a DAM zone.

Using the 2000 data to conduct a retrospective analysis, it appears that application of DAM in 2000 would have affected approximately 210 lobster vessels and 42 gillnet vessels in 6 areas that were affected for a total of 193 days. This analysis assumed that fishing effort in DAM Area 1 is uniformly distributed and is representative of fishing effort in the other 5 DAM areas. It is also important to note that these closures may be in addition to other closures and restrictions

imposed under the Magnuson-Stevens Act. Prohibiting fishing in these areas may result in reduced employment if the result is that the vessels do not fish on the days when a DAM zone has closed an area. Alternatively, a DAM closure in one area may shift fishing effort outside that area into adjacent areas. This effort shift may require more time away from family, friends and community as fishermen may need to travel further to reach fishing grounds not restricted. However, effort may be shifted inshore, perhaps closer to family, friends and community.

Social benefits may be realized if these DAM closures are effective at reducing the risk of entanglement to right whales, other marine mammals and sea turtles. If this reduced risk increases the potential for recovery, then society will benefit by preventing a loss of a species and preserving biodiversity. The extinction of the right whale would be a loss to society, which has placed a value on the protection of all species for their intrinsic value as well as for their contribution to biodiversity. While these DAM closures place time and area restrictions on fishing practices, they do not prohibit fishing all together in areas outside DAM zones. Social benefits are realized from the application of management practices that demonstrate that fishing practices and marine mammals can co-exist.

#### 5.3 PREFERRED ALTERNATIVE

The preferred alternative (PA) would identify gear modifications that NMFS may allow within a DAM zone. The modifications described in this section are in addition to those described in section 3.1. These modifications remove the requirement identified in the NPA 1 plan that lobster trap and anchored gillnet gear must be set with a single end line, thus allowing fishermen to use two end lines. In addition, under this alternative, gear could be modified to allow the use of floating line on the bottom third of each of the two end lines. This modification would require fishermen to use sinking or neutrally buoyant line on the upper two-thirds of each end line instead of throughout the entire end line as described under the NPA 1 plan.

# 5.3.1 Biological Impacts

This alternative considers the option of replacing the requirement that all buoy lines be made entirely of either sinking or neutrally buoyant line with regulations that allow fishermen to use floating line on the bottom third of the buoy line. Allowing a short section of floating line on the bottom portion of the buoy line would raise the line above the traps, thereby preventing the line from "wrapping" around the trap (and pulling the buoy below the surface) with each change in tide. NMFS has received reports that fishermen were planning on using "toggle buoys" or small gillnet floats to raise the bottom one-third of the end line off the bottom to prevent the line from wrapping around the trap. The use of a toggle or float has the

same effect as adding floating line to the bottom one-third of the end line, however, assuming that the toggle or float is not installed with a weak link, such devices on the line may pose a threat to a whale that becomes entangled in the gear since the toggle or float may prevent the end line from passing completely through the baleen in the whale's mouth. If allowing the use of floating line on the bottom one-third of the end line discourages fishermen from using a toggle or float, there may be some biological benefit to whales from such a provision. Consequently, allowing floating line on the bottom onethird of the end line could create an entanglement risk to right whales if it forms an arch or loop of line in the water column. However, information provided by the Massachusetts Division of Marine Fisheries after the publication of the proposed rule supports underwater video footage taken by NMFS, which documents that allowing one-third polypropylene line on the bottom third of the buoy line does not typically produce a loop in the water column because of currents and wave action on the surface system. Therefore, it appears that allowing floating line on the bottom third of the buoy line does not create an entanglement risk and may discourage the use of other means to prevent the buoy line from wrapping around the trap that could increase the risk to whales.

This alternative would require lobster trap and anchored gillnet fishermen to use gear with SAM gear modifications in a DAM zone, except fishermen would be allowed to retain a second end line on each end of the lobster trap or gillnet trawl. Requiring lobster trap and anchored gillnet fishermen to mark both ends of their trawls in a DAM zone with buoy lines would reduce gear conflicts, gear losses, and the proliferation of "ghost gear." Furthermore, under this alternative, the use of SAM gear modifications, such as weak links and neutrally buoyant or sinking ground lines and end lines, would have entanglement risk reduction benefits. NMFS acknowledges that vertical line between the gear and the surface system is a source of entanglement. draft EA, NMFS assumed that, under this alternative, the retention of a second end line would increase the risk of entanglement by 50 percent. However, based on the comments received, the benefits realized from requiring one buoy line in a DAM zone may not be as great as NMFS assumed in the draft EA. Requiring one buoy line may result in fishermen electing to set fewer traps or nets per buoy line by splitting trap trawls and net strings into shorter sets. As a result, there may be more vertical lines in the water as well as more ghost gear, both of which may actually increase the risk of entanglement to right whales.

The information and analysis provided in this document demonstrates that the gear modifications identified under this alternative for DAM sufficiently reduce the risk of entanglement to right whales by reducing the profile of gear suspended in the water column and requiring the use of weak links with reduced breaking strengths. The effectiveness of DAM, in general, and the PA gear modifications as an

alternative management measure for protecting right whales within a DAM zone, however, depends in part on the minimization of delays in achieving a reduction in line profile. Delays may be caused by the time between the formation of a concentration of right whales, the observation of that concentration, the time required to prepare and file a Federal Register notice implementing restrictions, and the time period allowed for compliance with the restrictions. If a DAM zone is triggered and the PA gear modifications are required, the time necessary for compliance may be reduced if lobster trap and anchored gillnet fishermen have already changed their gear over to comply with a DAM or SAM time/area gear restrictions. Furthermore, lobster trap and anchored gillnet fishermen that fish both inside and outside the SAM areas may prefer to change all of their gear over in order to be prepared should a DAM be triggered in the waters where their gear is set. Efforts such as these would minimize the time delays in complying with gear modification requirements in a DAM zone and have the overall benefit of reducing the risk of entanglement to right whales.

# 5.3.2 Economic Impacts

Under the PA, vessels fishing lobster or sink gillnet gear must modify their gear to continue fishing in the DAM area. The difference between the PA and the NPA 1 plan for the lobster and sink gillnet fishery is the PA allows: 1) 2 buoy lines per lobster trawl and string of sink gillnet gear; and 2) the buoy line can be composed of 2/3 neutrally buoyant or sinking line and 1/3 poly (floating) rope. Several potential scenarios exist as to how the fishing industry may adapt to this action. The scenarios include: 1) convert gear and continue fishing in DAM; 2) choose not to fish or convert gear; or 3) fish outside of the DAM area, do not convert gear, and move gear back into DAM when it reopens.

The economic analysis of the PA is divided into three sections. Sections 5.3.2.1 and 5.3.2.2 investigate the consequences of scenario 1 for the lobster and sink gillnet fleet, respectively. The results of the first two sections under scenario 1 are then summarized in Section 5.3.2.3. This summary section then ends with a discussion of scenario 2 and 3 as identified above.

# 5.3.2.1 Lobster Fleet

In this section we present the economic impacts of a DAM zone from June 20 to July 6 on the lobster fleet. To continue fishing in these areas a vessel must convert its gear. We start by presenting the cost of converting to PA gear. The economic impact of the DAM zone on the lobster fleet are evaluated next. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable and fixed vessel expenses and we end with results of a break

even analysis results. However, the only difference between the PA and NPA 1 plan is the gear conversion costs.

# Cost to convert gear

Under the PA, the use of 2 buoy lines per set of gear are allowed, the material composition of the buoy line changed, plus an extra weak link is required. First, the change in material costs will be presented followed by the change in cost for 2 buoy lines, followed by the cost of additional weak links. These changes will then be incorporated into a final gear conversion cost. We then present the annual loan payments for these gear conversion costs based on a 3 year term.

## Material cost of buoy lines

Material cost per buoy line (MC(BL)) is the product of the depth of the water (DOW), slack for tides (Slack=1.5), and the dollar price per unit (\$/unit). The cost of 3/8" neutrally buoyant line is \$0.06 per foot and the poly rope is \$0.03 per foot. Under the PA, 2/3 of the buoy line can be neutrally buoyant (NB) and 1/3 poly rope (PR). Labor cost of the buoy lines is the same as proposed under the NPA 1 plan. In equation form we have:

# MC(BL) = DOW\*Slack\*[(2/3)\*\$/ NB unit + (1/3)\*\$/PR unit)]

Under the NPA 1 plan, the material cost for one 3/8" buoy line made of 100 percent neutrally buoyant is \$15.93 versus \$13.27 for a buoy line composed of 2/3 neutrally buoyant and 1/3 poly rope.

The lower and upper bound material costs of two buoy lines under the PA for a Class I and Class II lobster vessel are \$469.93(\$469.93 = 17.7 trawls\*MC(BL)\*2) and \$1,415.11 (\$1,415.11=53.3 trawls\*MC(BL)\*2), respectively. Under the NPA 1 plan, the lower and upper bound labor was \$22 and \$66 for one buoy line and is therefore \$44 and \$132, for 2 buoy lines (Table 5.1.2.2). Therefore, the total lower and upper bound costs of two buoy lines under the PA for Class I and Class II lobster vessels are \$513.93 and \$1,547.11, respectively. 15

#### Material and labor cost of weak links

Each buoy line for a Class I and Class II lobster vessel must have a weak link with a breaking strength of 1,500 pounds on the high flyer and the buoy ball. Under the NPA 1 plan, the lower and upper bound material and labor cost per vessel per buoy line was \$128 and \$387, respectively (Table 5.1.2.2). Therefore, under the PA, the cost of weak links (WL) for 2 buoy lines are \$256 and \$774, respectively.

 $<sup>^{15}</sup>$  The total lower and upper bound cost of one buoy lines under the PA plan is \$304 and \$915, respectively (Table 5.1.2.2).

Total Material and labor cost of converting gear

The total lower and upper bound costs of converting gear are \$2,831 (=\$514(BL) + \$2,061(NB on GL) + \$256(WL)) and \$8,527 (=\$1,547(BL) + \$6,206(NB on GL) + \$774(WL)), respectively. For details of neutrally buoyant line on the ground line (NB on GL) see Table 5.1.2.2.

## 3 Year Loan

We assume a vessel will take a 3 year business loan to pay for the upfront material and labor costs of converting its gear. 16 Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here. For a Class I or Class II lobster vessel fishing in the Nearshore Lobster Waters, the lower bound gear conversion cost is \$2,831, and annual payments are \$1,072 with a total loan payment of \$3,216. With the upper bound cost of \$8,527, annual payments are \$3,230 with a total loan payment of \$9,690.

#### DAM

Estimate of the number of vessels

The number of vessels are the same as those presented under the NPA 1 plan. We assume the upper bound estimate is 29 lobster vessels of which 13 vessels are Class I lobster vessels and 16 are Class II lobster vessels. For details see Section 5.1.2.1.

Revenues and landings

Revenues and landings are the same as those presented under the NPA 1 plan.

Variable and Fixed Vessel Expenses

Variable and Fixed Vessel Expenses are the same as those presented under the NPA 1 plan.

Results of Break Even Analysis

The break even analysis results are the same as those presented under the NPA 1 plan with no regulation. The difference in the lower bound (and upper bound) gear conversion costs between the PA and NPA 1 plan is \$128 (\$397 UB) for a Class I and Class II vessel. Given this slight difference in cost for the lobster fishery, the results will be reported with the sink gillnet fishery in the summary section (See Section 5.3.2.3).

<sup>&</sup>lt;sup>16</sup> The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, pers. comm.). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

# 5.3.2.2 Sink Gillnet Fleet

In this section we present the economic impacts of a DAM zone from June 20 to July 6 on the sink gillnet fleet. To continue fishing in these areas a vessel must convert its gear. We start by presenting the cost of converting gear. The economic impact of the DAM zone on the sink gillnet fleet are evaluated next. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable and fixed vessel expenses and we end with results of a break even analysis results. However, the only difference between the PA and NPA 1 plan is the gear conversion cost.

# Cost to convert gear

Under the PA, the use of 2 buoy line per set of gear are allowed, the material composition of the buoy line changed, plus an extra weak link is required. First, the change in material costs will be presented followed by the change in cost for 2 buoy lines, followed by the cost of additional weak links. These changes will then be incorporated into a final gear conversion cost. We then present the annual loan payments for these gear conversion costs based on a 3 year term.

# Material cost of buoy lines

Material cost per buoy line (MC(BL)) is the product of the depth of the water (DOW), slack for tides (Slack=1.5), and the dollar price per unit (\$/unit). The cost of 3/8" neutrally buoyant line is \$0.06 per foot and the poly rope is \$0.03 per foot. The cost of 5/8" neutrally buoyant line is \$0.211 per foot and the poly rope is \$0.10 per foot. Under the PA, 2/3 of the buoy line can be neutrally buoyant (NB) and 1/3 poly rope (PR). Labor costs of the buoy lines are the same as those presented under the NPA 1 plan. Social benefits may be realized if these gear modifications for DAM zones are effective at reducing the risk of entanglement to right whales, other marine mammals, and sea turtles. If this reduced risk increases the potential for recovery, then society will benefit by preventing a loss of a species and preserving biodiversity. While these DAM gear modifications place time and area restrictions on fishing practices, they do not prohibit fishing all together. Social benefits are realized from the application of management practices that demonstrate that fishing practices and marine mammals can co-exist.

# MC(BL) = DOW\*Slack\*[(2/3)\*\$/ NB unit + (1/3)\*\$/PR unit)] Additional ly, if

NMFS implements a DAM zone with NPA 1 gear modifications, fishermen who fish with SAM or similarly modified gear would be able to comply quicker to protect right whales then if they had to completely remove gear from the area. For example, fishermen that modify their gear to fish within the SAM area would be able to fish within a DAM zone if NMFS decided to implement NPA 1 gear modifications in the zone. In equation form we have:

A Class I sink gillnet vessel fishing nearshore used 3/8" line and a Class II sink gillnet vessel typically uses a 5/8" line. Under the NPA 1 plan, the material cost for one 3/8" and 5/8" buoy line made of 100 percent neutrally buoyant is \$15.93 versus \$132.61, respectively. Therefore, under the PA, the material cost for a 3/8" and 5/8" buoy line composed of 2/3 neutrally buoyant and 1/3 poly rope is \$13.28 and \$109.36, respectively.

The cost of two buoy lines under the PA for a Class I and Class II sink vessel are \$127.44(\$127.44 = 4.8 strings\*MC(BL)\*2) and \$2,403.28 (\$2,403.28=10.7 strings\*MC(BL)\*2), respectively. Under the NPA 1 plan, the Class I and II labor cost was \$5.97 and \$31.50 for one buoy line and is therefore \$11.94 and \$63, for 2 buoy lines (Table 5.1.2.8). Therefore, the total costs of two buoy lines under the PA for Class I and Class II sink gillnet vessel are \$139.38 and \$2,466.28, respectively. 17

# Material and labor cost of weak links

Each buoy line for a Class I and Class II sink gillnet vessel must have a weak link attached near the high flyer and the buoy ball. Under the NPA 1 plan, the material and labor cost of a weak link per vessel per buoy line was roughly \$11 for a Class I vessel and \$25 for a Class II vessel (Table 5.1.2.8). Therefore, under the PA, the cost of weak links (WL) for 2 buoy lines are \$22 and \$50 for a Class I and Class II sink gillnet vessel, respectively.

Total Material and labor cost of converting to PA gear

For Class I sink gillnet vessels, the cost of installing 1,100 pound weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link is \$489, \$139, \$196, and \$22, totaling \$846. Similarly for a Class II vessel it costs \$1,927, \$2,403, \$681, and \$50 to install 1,100 pound weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link (see footnote 18), respectively, totaling \$5,063. The largest cost component for both vessel types is the 1,100 pound weak links. If the break-away floats are available, the total cost per vessel for a Class

The total cost per vessel of one buoy line under the PA plan, for a Class I and II sink gillnet vessel is \$82 and \$1,450.56, respectively.

<sup>&</sup>lt;sup>18</sup> During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively. However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas. Therefore, the analysis of costs incurred is likely to be overestimated.

I vessel and Class II vessel is \$1,426 and \$7,367, respectively (Table 5.1.2.10). For details of neutrally buoyant line on the anchor line (NB on AL) or weak links, see Table 5.1.2.8.

# 3 Year Loan

We assume a vessel will take a 3 year business loan to pay for the upfront material and labor costs of converting its gear. <sup>19</sup> Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here.

For a Class I sink gillnet vessel, the lower bound gear conversion cost is \$846, and annual payments are \$321 with a total loan payment of \$963. With the upper bound cost of \$1,426, annual payments are \$540 with a total loan payment of \$1,620.

For a Class II sink gillnet vessel, the lower bound gear conversion cost is \$5,063, and annual payments are \$1,918 with a total loan payment of \$5,754. With the upper bound cost of \$7,367, annual payments are \$2,790 with a total loan payment of \$8,370.

## DAM

Estimate of the number of vessels

The number of sink gillnet vessels are the same as those presented under the NPA 1 plan. There are 16 sink gillnet vessels fishing in the DAM zone, of which 4 vessels are Class I and 12 are Class II vessels. For details see Section 5.1.2.2.

Revenues and landings

Revenues and landings are the same as those presented under the NPA  $1\,$  plan.

Variable and Fixed Vessel Expenses

Variable and Fixed Vessel Expenses are the same as those presented under the NPA 1 plan.

Results of Profit Analysis

The profit analysis results are the same as those presented under the NPA 1 plan with no regulation. The upper bounds gear conversion cost of a Class I sink gillnet vessel(and Class II) differ by \$29 (\$978 for Class II) between the PA and NPA 1 plan. Given this slight difference

in cost for the sink gillnet fishery, the results will be reported with the lobster fishery in the summary section (See Section 5.3.2.3).

<sup>&</sup>lt;sup>19</sup> The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, pers. comm.). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

# 5.3.2.3 Summary of PA

Three potential scenarios considered as to how the fishing industry may react to the PA include: 1) convert their gear and continue fishing in DAM; 2) do not convert their gear and choose not to fish during this time period; or 3) do not convert gear, fish outside of the DAM area until it reopens and then move the gear back inside DAM. Each scenario will be discussed in this summary section.

# Scenario 1: Vessels convert their gear

Vessels fishing both lobster and sink gillnet gear have been grouped by size classes. The annual cost of converting gear ranges between a low of \$321 for a Class I sink gillnet vessel to a high of \$3,230 for a Class I or Class II lobster vessel (Table 5.3.2.1). In general, we assume vessels fishing lobster gear will take out a 3 year term loan at 8.5 percent to pay for the cost of converting their gear.

# Table 5.3.2.1

Summary of PA vessels, annual revenues, variable and fixed expenses and profits per vessels with out this regulation, annual gear payments and reduction of profits due this regulation (ie. gear conversion costs) per vessel by fleet and vessel length class.

	DAM					
	Lobster Class I Class II					
Vessel Length in Feet  Number of Vessels	< 35 13	< 50 16	< 40 4	> 40 12		
Per Vessel Annual Revenues	59 <b>,</b> 700			256,500		
Variable and Fixed Expenses	28,400	35,100	14,300	30,800		
Profits w/out PA	31,300	117,500	73 <b>,</b> 950	128,650		
Annual Gear Loan Payment LB UB	1,072 3,230	1,072 3,230	321 540	1,918 2,790		
Annual Profits Reduction LB UB	0.034	0.009 0.027	0.004 0.007			

Under this scenario, Class I and Class II lobster vessels in the DAM zone from June 20 to July 6 can absorb the cost of converting their gear, continue to fish and earn a profit. Their annual profits are reduced by a minimum of 0.9 percent and a maximum of 10.3 percent under this alternative (Table 5.3.2.1).

Class I and Class II vessels fishing sink gillnet gear in the DAM zone should also be able to absorb the cost of converting their gear, continue to fish and earn profits. Their profits were reduced by a minimum of 0.4 percent and a maximum of 2.2 percent (Table 5.3.2.1).

Table 5.3.2.2

Summary of PA vessels, annual loan payments, industry cost of converting gear and forgone revenues by fleet and vessel length class.

		DAM				
	Lobs	Lobster		Sink Gillnet		
	Class 1	Class II	Class I	Class II		
Vessel Length (Fee	t) < 35	35 <l< 50<="" td=""><td>&lt; 40</td><td>&gt; 40</td><td></td></l<>	< 40	> 40		
Number of Vessel	s 13	16	4	16	45	
Annual Loan Payme LB UB	1,072	1,072 3,230	321 540	1,918 2,790		
Industry						
Total						
LB UB	- ,	17,152 51,680	1,284 2,160		55,388 129,310	

Finally, the total lower and upper bound industry gear conversion costs for 45 vessels in the lobster and sink gillnet fleet are \$55.4K and \$129.3K, respectively (Table 5.3.2.2). This estimate includes the annual loan payment a lobster and sink gillnet vessel will pay to convert its gear.

The total lower and upper bound industry costs for the lobster fleet are \$31.1K and \$93.7K, respectively. Total lower and upper bound industry costs for the sink gillnet fleet are \$24.3K and \$35.6K, respectively.

Scenario 2: As a second scenario, a vessel may choose not to convert its gear or fish. Vessels incur the cost of removing and resetting

their gear in the water, plus forgone revenues. These vessels must weigh their loss in profits against the risk they take of losing fishing bottom to another vessel. That is, once gear is removed from an area, it is then open for any other vessel to fish it given they comply with this regulation. Based on the estimated profit reductions of scenario 1, all vessels are likely to convert their gear.

Scenario 3: In the third scenario, a vessel may choose not to convert its gear and fish outside of the DAM zone from June 20 to July 6. In this case, the vessels revenue's would be influenced by the catch rates inside and outside of the DAM area. If the catch rates are lower outside and there is bottom available to fish, vessel profits would be reduced. In addition, the vessel would incur the extra labor and fuel cost associated with moving and resetting their gear inside and out of DAM. They also take the risk of losing their fishing territory in DAM to another vessel. Based on the estimated profit reductions of scenario 1, all vessels are likely to convert their gear.

Conclusion: All sink gillnet vessels are likely to choose scenario 1 since annual profits are reduced by a maximum of 2.2 percent. Class I and Class II lobster vessels are also likely to choose scenario 1 since profits are reduced by a maximum of 10.3 percent.

# 5.3.3 Social Impacts

Because the DAM gear modifications identified under this alternative allow for the retention of a double end line and floating line on the bottom third of each end line, their adoption does not have significant effects within the fishing community on employment and other aspects of life. However, the recommendation to require sinking or neutrally buoyant line on the ground line may affect those segments of the fishing community that fish in areas outside SAM because the existing ALWTRP regulations for those areas do not already require this type of gear modification. Once a DAM zone is triggered and established, the restrictions implemented would be effective for 15 days. During that 15 day restricted period, those vessels that do not or can not comply with the identified gear modifications could either not fish at all or fish in another unrestricted location. This may result in short term unemployment or have some impact on family and community if, during those 15 days, fishing vessels have to travel further from home to access open fishing grounds. However, effort may be shifted inshore, perhaps closer to family, friends and community.

Social benefits may be realized if these gear modifications for DAM zones are effective at reducing the risk of entanglement to right whales, other marine mammals, and sea turtles. If this reduced risk increases the potential for recovery, then society will benefit by preventing a loss of a species and preserving biodiversity. While these DAM gear modifications place time and area restrictions on

fishing practices, they do not prohibit fishing all together. Social benefits are realized from the application of management practices that demonstrate that fishing practices and marine mammals can coexist.

Additionally, if NMFS implements a DAM zone with PA gear modifications, fishermen who fish with SAM or similarly modified gear would be able to comply quicker to protect right whales then if they had to completely remove gear from the area. For example, fishermen that modify their gear to fish within the SAM area would be able to fish within a DAM zone if NMFS decided to implement PA gear modifications in the zone.

# 5.4 NON-PREFERRED ALTERNATIVE 2

This alternative, non-preferred alternative 2 (NPA 2), would implement the same gear modifications as described in Section 3.1 except that fishermen would be allowed to use two end lines instead of one. This alternative is different from the PA, because it would not allow the bottom one-third of the end line to be composed of floating line. Under this alternative, ground lines and end lines would have to be composed entirely of neutrally buoyant or sinking line.

# 5.4.1 Biological Impacts

Floating line has been identified as the source of North Atlantic right whale entanglement because the line is designed to float in the water column to avoid contact with the bottom of the ocean during lower tides. The slack in the floating line is identified as a source of North Atlantic right whale entanglement. NMFS determined that typical offshore lobster pot gear is configured with approximately 7,000 ft (2,134 m) of floating line. Video recording of typical lobster gear with floating groundline between traps revealed that the line forms large loops in the water column between traps. Similar video recording of neutrally buoyant line between traps revealed that it did not have the same vertical profile as floating line; rather, it was located on or near the bottom and was not presented to North Atlantic right whales as an entanglement risk. To minimize interactions between fishing gear and North Atlantic right whales, this alternative for DAM gear modifications would prohibit floating line for all lobster pot and gillnet gear within the DAM zones during the restricted period. By eliminating floating line and requiring sinking or neutrally buoyant line, approximately 85 percent of the line within the water column would be eliminated.

This alternative would require lobster trap and anchored gillnet fishermen to use gear with SAM gear modifications in a DAM zone, except fishermen would be allowed to retain a second end line on each end of the lobster trap or gillnet trawl. Requiring lobster trap and

anchored gillnet fishermen to mark both ends of their trawls with buoy lines would reduce gear conflicts, gear losses, and the proliferation of "ghost gear." Under this alternative, the use of SAM gear modifications, such as weak links and neutrally buoyant or sinking ground lines and end lines, would have entanglement risk reduction benefits. NMFS acknowledges that vertical line between the gear and the surface system is a source of entanglement. In the draft EA, NMFS assumed that, under this alternative, the retention of a second end line would increase the risk of entanglement by 50 percent. However, based on the comments received, the benefits realized from requiring one buoy line in a DAM zone may not be as great as NMFS assumed in the draft EA. For example, comments from commercial fishing associations, state agencies, and members of Congress indicate that requiring one buoy liner per trawl or net string could have the potential to increase the rate of gear loss and gear conflicts, since it is already common for lobstermen fishing in certain areas to lose one of their two buoy lines. Therefore, in order to reduce the potential for losing gear if only one buoy line is allowed per trawl or net string, fishermen may elect to set fewer traps or nets per buoy line by splitting trap trawls and net strings into shorter sets. As a result, there may be more vertical lines in the water as well as more ghost gear, both of which may actually increase the risk of entanglement to right whales.

The information and analysis provided in this document demonstrates that the gear modifications identified under this alternative for DAM sufficiently reduce the risk of entanglement to right whales by reducing the profile of gear suspended in the water column and requiring the use of weak links with reduced breaking strengths. effectiveness of DAM, in general, and the NPA 2 gear modifications as an alternative management measure for protecting right whales within a DAM zone, however, depends in part on the minimization of delays in achieving a reduction in line profile. Delays may be caused by the time between the formation of a concentration of right whales, the observation of that concentration, the time required to prepare and file a Federal Register notice implementing restrictions, and the time period allowed for compliance with the restrictions. If a DAM zone is triggered and the NPA 2 gear modifications are required, the time necessary for compliance may be reduced if lobster trap and anchored gillnet fishermen have already changed their gear over to comply with the DAM and SAM time/area gear modifications. Furthermore, lobster trap and anchored gillnet fishermen that fish both inside and outside the SAM areas may prefer to change all of their gear over in order to be prepared should a DAM be triggered in the waters where their gear is set. Efforts such as these would minimize the time delays in complying with gear modification requirements in a DAM zone and have the overall benefit of reducing the risk of entanglement to right whales.

## 5.4.2 Economic Impacts

Under the non-preferred alternative 2 (NPA 2) plan, vessels fishing lobster or sink gillnet gear must modify their gear to continue fishing in the DAM area. The difference between the NPA 1 plan and the NPA 2 plan for the lobster and sink gillnet fishery is the NPA 2 plan allows 2 buoy lines per lobster trawl and string of sink gillnet gear. Several potential scenarios exist as to how the fishing industry may adapt to the NPA 2 plan. The scenarios include: 1) convert their gear in accordance with the NPA 2 gear modifications and continue fishing in DAM; 2) choose not to fish or convert their gear; or 3) fish outside of the DAM area, do not convert their gear, and move gear back into DAM when it reopens.

The economic analysis of the NPA 2 plan is divided into three sections. Sections 5.4.2.1 and 5.4.2.2 investigate the consequences of scenario 1 for the lobster and sink gillnet fleet, respectively. The results of the first two sections under scenario 1 are then summarized in Section 5.4.2.3. This summary section then ends with a discussion of scenarios 2 and 3 as identified above.

### 5.4.2.1 Lobster Fleet

In this section we present the economic impacts of a DAM zone from June 20 to July 6 on the lobster fleet. To continue fishing in these areas, a vessel must convert to NPA 2 gear. We start by presenting the cost of converting their gear. The economic impacts of the DAM zone on the lobster fleet are evaluated next. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable and fixed vessel expenses and we end with results of a break even analysis results. However, the only difference between the NPA 1 plan and NPA 2 plan is the gear conversion costs.

# Cost to convert gear

Under the NPA 2 plan, the use of 2 buoy line per set of gear are allowed, plus an extra weak link is required. The material composition of the buoy line under the NPA 2 plan is the same as the NPA 1 plan. First the cost of 2 buoy lines is presented, followed by the cost of additional weak links. These changes will then be incorporated into a final gear conversion cost. We then present the annual loan payments for these gear conversion costs based on a 3 year term.

Material cost of buoy lines

The lower and upper bound material costs of two buoy lines under the

NPA 2 plan for a Class I and Class II lobster vessel are \$608 and \$1,830 (see Table 5.1.2.2).

Material and labor cost of weak links

Each buoy line for a Class I and Class II lobster vessel must have a weak link attached near the high flyer and the buoy ball. Under the NPA 1 plan, the lower and upper bound material and labor cost per vessel per buoy line was \$128 and \$387, respectively (Table 5.1.2.2). Therefore, under the NPA 2 plan, the cost for 2 buoy line weak links (WL) is \$256 and \$774, respectively.

Total Material and labor cost of converting gear

The total lower and upper bound costs of converting gear are \$2,921 (=\$604(BL) + \$2,061(NB on GL) + \$256(WL)) and \$8,810 (=\$1,830(BL) + \$6,206(NB on GL) + \$774(WL)), respectively. For details of neutrally buoyant line on the ground line (NB on GL) see Table 5.1.2.2.

## 3 Year Loan

We assume a vessel will take a 3 year business loan to pay for the upfront material and labor costs of converting its gear. Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here. For a Class I or Class II lobster vessel, the lower bound gear conversion cost is \$2,921, and annual payments are \$1,107 with a total loan payment of \$3,321. With the upper bound cost of \$8,810, annual payments are \$3,337 with a total loan payment of \$10,011.

# DAM

Estimate of the number of vessels

The number of vessels are the same as those presented under the NPA 1 plan. We assume the upper bound estimate is 29 lobster vessels of which 13 vessels are Class I lobster vessels and 16 are Class II lobster vessels. For details see Section 5.1.2.1.

Revenues and landings

Revenues and landings are the same as those presented under the NPA  $1\,$  plan.

The total lower and upper bound cost of one buoy lines under the NPA 1 plan is \$304 and \$915, respectively.

<sup>&</sup>lt;sup>21</sup> The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, pers. comm.). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

Variable and Fixed Vessel Expenses

Variable and Fixed Vessel Expenses are the same as those presented under the NPA 1 plan.

Results of Break Even Analysis

The break even analysis results are the same as those presented under the NPA 1 plan with no regulation. The difference in the lower bound (and upper bound) gear conversion costs between the NPA 1 plan and NPA 2 plan is \$428 (\$1,302 UB) for a Class I and Class II vessel. Given this slight difference in cost for the lobster fishery, the results will be reported with the sink gillnet fishery in the summary section (See Section 5.4.2.3).

#### 5.4.2.2 Sink Gillnet Fleet

In this section we present the economic impacts of a DAM zone from June 20 to July 6 on the sink gillnet fleet. To continue fishing in these areas, a vessel must convert its gear. We start by presenting the cost of converting gear. The economic impact of the DAM zone on the sink gillnet fleet are evaluated next. This includes estimating the number of vessels fishing in the area, revenues earned per vessel, annual variable, and fixed vessel expenses and we end with results of a break even analysis results. However, the only difference between the NPA 1 plan and NPA 2 plan is the gear conversion cost.

## Cost to convert gear

Under the NPA 2 plan, the use of 2 buoy line per set of gear are allowed, plus an extra weak link is required. The material composition of the buoy line under the NPA 1 plan and NPA 2 plan are the same. First, the cost of 2 buoy lines are presented, followed by the cost of additional weak links. These changes will then be incorporated into a final gear conversion cost. We then present the annual loan payments for these gear conversion costs based on a 3 year term.

Material cost of buoy lines

The cost of two buoy lines under the NPA 2 plan for a Class I and Class II sink vessel are \$164.92 and  $$2,900.92.^{22}$ 

Material and labor cost of weak links

Each buoy line for a Class I and Class II sink gillnet vessel must have a weak link attached near the high flyer and the buoy ball. Under the NPA 1 plan, the material and labor cost of a weak link per vessel per buoy line was roughly \$11 for a Class I vessel and \$25 for a Class II vessel (Table 5.1.2.8). Therefore, the cost of weak links

 $<sup>^{22}\,\</sup>text{The}$  total cost per vessel of one buoy line under the NPA 1 plan, for a Class I and II sink gillnet vessel is \$82 and \$1,450.56, respectively.

(WL) for 2 buoy lines are \$22 and \$50 for a Class I and Class II sink gillnet vessel, respectively.

Total Material and labor cost of converting gear

For Class I sink gillnet vessels, the cost of installing 1,100 pound weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link is \$489, \$165, \$196, and \$22, totaling \$872.23 Similarly, for a Class II vessel it costs \$1,927, \$2,901, \$681, and \$50 to install 1,100 pound weak links, neutrally buoyant line on the buoy, anchor and ground line and a 3,780 pound weak link (see footnote 23), respectively, totaling \$5,559. If the break-away floats are available, the total cost per vessel for a Class I vessel and Class II vessel is \$1,450 and \$7,864, respectively. For details of neutrally buoyant line on the anchor line (NB on AL) or weak links, see Table 5.1.2.8.

## 3 Year Loan

We assume a vessel will take a 3 year business loan to pay for the upfront material and labor costs of converting its gear. Interest rates for short term business loans range between 6 percent and 11 percent depending on an individual's credit history. An average of 8.5 percent was used here.

For a Class I sink gillnet vessel, the lower bound gear conversion cost is \$872, and annual payments are \$330 with a total loan payment of \$990. With the upper bound cost of \$1,450, annual payments are \$549 with a total loan payment of \$1,647.

For a Class II sink gillnet vessel, the lower bound gear conversion cost is \$5,559, and annual payments are \$2,106 with a total loan payment of \$6,318. With the upper bound cost of \$7,864, annual payments are \$2,979 with a total loan payment of \$8,937.

### DAM

Estimate of the number of vessels

During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively. However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas. Therefore, the analysis of costs incurred is likely to be overestimated.

<sup>&</sup>lt;sup>24</sup> The shelf life of neutrally buoyant line is unknown. Typically ground and buoy lines made of polypropylene are replaced every 6 years on average (NMFS, pers. comm.). The neutrally buoyant line may have a shorter life since the fibers of the rope will be in contact with the sediment more compared to the existing polypropylene line. We assume a vessel would not want to have a loan payment for a product that is longer than the life of the product. We therefore chose 3 years as the term length of the loan.

The number of sink gillnet vessels are the same as those presented under the NPA 1 plan. There are 16 sink gillnet vessels fishing in the DAM zone, of which 4 vessels are Class I and 12 are Class II vessels. For details see Section 5.1.2.2.

Revenues and landings

Revenues and landings are the same as those presented under the NPA 1 plan.

Variable and Fixed Vessel Expenses

Variable and Fixed Vessel Expenses are the same as those presented under the NPA 1 plan.

Results of Profit Analysis

The profit analysis results are the same as those presented under the NPA 1 plan with no regulation. The upper bounds annual loan payment for the cost of converting gear for a Class I sink gillnet vessel (and Class II) differ by \$35 (\$559 for Class II) between the NPA 1 plan and NPA 2 plan. Given this slight difference in cost for the sink gillnet fishery, the results will be reported with the lobster fishery in the summary section (See Section 5.4.2.3).

## 5.4.2.3 Summary of NPA 2

Three potential scenarios considered as to how the fishing industry may react to this non-preferred alternative include: 1) convert their gear and continue fishing in DAM; 2) do not convert their gear and choose not to fish during this time period; or 3) do not convert their gear, fish outside of the DAM area until it reopens, and then move the gear back inside DAM. Each scenario will be discussed in this summary section.

Scenario 1: Vessels convert their gear. Vessels fishing both lobster and sink gillnet gear have been grouped by size classes. The annual cost of converting gear ranges between a low of \$330 for a Class I sink gillnet vessel to a high of \$3,337 for a Class I or Class II lobster vessel. In general, we assume vessels fishing lobster gear will take out a 3 year term loan at 8.5 percent to pay for the cost of converting their gear.

Under this scenario, Class I and Class II lobster vessels in the DAM zone from June 20 to July 6 can absorb the cost of converting their gear, continue to fish, and earn a profit. Their annual profits are reduced by a minimum of 0.9 percent and a maximum of 10.7 percent under this alternative (Table 5.4.2.1).

### Table 5.4.2.1

Summary of NPA 2 vessels, annual revenues, variable and fixed expenses and profits per vessels with out this regulation, annual gear payments and reduction of profits due this regulation (ie. gear conversion costs) per vessel by fleet and vessel length class.

	DAM							
	Lobster Sink Gillnet Class I Class I Class I							
Vessel Length in Feet	< 35		< 40	> 40				
Number of Vessels	13	16	4	12				
Per Vessel Annual Revenues	59 <b>,</b> 700	152,600	162,200	256,500				
Variable and Fixed Expenses	28,400	35 <b>,</b> 100	14,300	30,800				
Profits w/out PA	31,300	117,500	73 <b>,</b> 950	128,650				
Annual Gear Loan Payment LB UB	1,107 3,337	1,107 3,337	330 549	,				
Annual Profits Reduction LB UB	0.035 0.107	0.009	0.005 0.007	0.016 0.023				

Class I and Class II vessels fishing sink gillnet gear in the DAM zone should also be able to absorb the cost of converting their gear, continue to fish, and earn profits. Their profits were reduced by a minimum of 0.5 percent and a maximum of 2.3 percent (Table 5.4.2.1).

Finally, the total lower and upper bound industry gear conversion costs for 45 vessels in the lobster and sink gillnet fleet are \$58.7K and \$134.7K, respectively (Table 5.4.2.2). This estimate includes the annual loan payment a lobster and sink gillnet vessel will pay to convert its gear.

The total lower and upper bound industry costs for the lobster fleet are \$32.1K and \$96.8K, respectively (Table 5.4.2.2). Total lower and

upper bound industry costs for the sink gillnet fleet are \$26.7K and \$37.9K, respectively.

### Table 5.4.2.2

Summary of NPA 2 vessels, annual loan payments, industry cost of converting gear and forgone revenues by fleet and vessel length class

DAM								
		Lobs	ter	Sink G	illnet			
		Class 1	Class II	Class I	Class II			
Vessel Length	(Feet)	< 35	35 <l< 50<="" td=""><td>&lt; 40</td><td>&gt; 40</td><td></td></l<>	< 40	> 40			
Number of V	essels	13	16	4	12	45		
Annual Loan I	LB UB	1,107 3,337	1,107 3,337	330 549				
Industr	У							
Total	LB UB	14,391 43,381	•	1,320 2,196	25,272 35,748	58,695 134,717		

Scenario 2: As a second scenario, a vessel may choose not to convert its gear or fish. Vessels incur the cost of removing and resetting their gear in the water, plus forgone revenues. These vessels must weigh their loss in profits against the risk they take of losing fishing bottom to another vessel. That is, once gear is removed from an area, it opens for any other vessel to fish it given they comply with this regulation. Based on the estimated profit reductions of scenario 1, all vessels are likely to convert their gear.

Scenario 3: In the third scenario, a vessel may choose not to convert its gear and fish outside of the DAM zone from June 20 to July 6. In this case, the vessel's revenues would be influenced by the catch rates inside and outside of the restricted area. If the catch rates are lower outside and there is bottom available to fish, vessel profits would be reduced. In addition, the vessel would incur the extra labor and fuel cost associated with moving and resetting their gear inside and out of a DAM zone. They also take the risk of losing their fishing territory in the DAM zone to another vessel. Based on the estimated profit reductions of scenario 1, all vessels are likely to convert their gear.

Conclusion: All sink gillnet vessels are likely to choose scenario 1 since annual profits are reduced by a maximum of 2.3 percent. Class I

and Class II lobster vessels are likely to choose scenario 1 since profits are reduced by a maximum of 10.7 percent.

## 5.4.3 Social Impacts

The DAM gear modifications identified under this alternative result in the retention of a double end line, therefore, their adoption does not have significant effects within the fishing community on employment and other aspects of life. However, the changeover to end lines and ground lines made entirely of neutrally buoyant or sinking line may affect those segments of the fishing community that fish in areas outside SAM because the existing ALWTRP regulations for those areas do not already require this type of gear modification. Anchored gillnet fishermen in the areas outside SAM would be similarly affected. Once a DAM zone is triggered and established, the restrictions implemented would be effective for 15 days. During that 15-day restricted period, those vessels that do not or can not comply with the identified gear modifications could either not fish at all or fish in another unrestricted location. This may result in short term unemployment or have some impact on family and community if, during those 15 days, fishing vessels have to travel further from home to access open fishing grounds. However, effort may be shifted inshore, perhaps closer to family, friends and community.

## 6.0 POTENTIAL CUMULATIVE EFFECTS

This section estimates the cumulative effects of several preferred alternative plans implemented with the intention of protecting right whales. Three types of plans exist. The first plan requires gear modifications (NMFS 1997; NMFS 2000; NMFS 2002). Dynamic Area Management (DAM) was the second plan. Under DAM, a sighting of 3 right whales at a density of 0.04 right whales per square nautical mile could trigger a closure to all lobster and sink gillnet gear. Seasonal Area Management (SAM) allows lobster trap and sink gillnet vessels to fish in two SAM areas if the vessels convert to low entanglement risk gear. Here we propose a modification to the earlier DAM EA. Specifically, vessels are allowed to fish in a DAM zone if the also convert to low entanglement risk gear. See Section 8.1 (Right Whale Management) for an explanation of the overall strategy of these plans.

The regulation identifying gear modifications for DAM would be put in place after the 2002 Gear, DAM and SAM regulations. The last regulation put in place was SAM. To assess the cumulative effects of the proposed DAM, we need to first adjust the cumulative effects of the current DAM program.

In the previous DAM rule, we assumed vessels would not fish during the restricted period and there would be a loss due to forgone revenues

and the cost of moving the gear out of a DAM zone. According to Clapham and Pace (2000), 6 DAM zones would have been triggered in 2000. The SAM rule encompassed 4 of the 6 DAM zones. One DAM zone was in Canadian waters and, therefore, out of U.S. jurisdiction. One DAM zone remains. Specifically, DAM Area 8 from June  $20^{\rm th}$  to July  $6^{\rm th}$ . In the SAM EA we assumed vessels would choose not to fish, incur the loss of revenues and the cost of moving gear out of the DAM zone, which was assessed at \$325K for the lobster fleet and \$275K for the sink gillnet fleet (Table 6.0.1). Therefore the total cumulative effects for the lobster and sink gillnet fleet reported in the last SAM EA were \$2,173K as a lower bound and \$5,933K as an upper bound (Table 6.0.2).

Table 6.0.1.

Total forgone revenues for the lobster and sink gillnet fleet associated with DAM by area

		DAM				
		Lobster	Sink			
			Gillnet			
DAM	Area					
	1	1,302,000	1,101,240			
	4	802 <b>,</b> 615	678 <b>,</b> 857			
	5	352 <b>,</b> 760	298 <b>,</b> 367			
	6	180,200	152,415			
	7	205,324	173 <b>,</b> 511			
	8	324 <b>,</b> 979	274,870			
Tot	tal	3,167,878	2,679,260			

Under the proposed DAM action, the lower and upper bound cost for both fleets are \$47K and \$113K, respectively (Table 6.0.2). The lower and upper bound cumulative effects based on the proposed DAM EA are \$1,620 and \$5446K, respectively. These updated cumulative effects are lower than the cumulative effects reported in the SAM rule.

Table 6.0.2

Summary of cumulative effects of the Gear, previous DAM, and SAM regulations as reported in the last SAM regulation, and the updated cumulative effects with the proposed DAM regulation by fleet.

		Gear regulations SAM Previous								
									Proposed DAM	Cumulative Effects
Fleets		1997	2000	2001	Total S	AM	DAM	Cumm		
Lobster	LB UB	129 276	191 539		1,16915 4,73032			1,647 5,375		1,349 5,132
Gillnet	PT LB UB	0.3	109	99	208.3	43 75	275	526.3 558.3		271 314
Total		129.3 276.3	300 648	948 4 <b>,</b> 014	5,847 1 5,847 3			) 2 <b>,</b> 173 ) 5 <b>,</b> 933		1,620 5,446

In the previous DAM rule we assumed all vessels would choose not to fish. Therefore, the total cost was forgone revenues plus the cost of moving gear, as a result of the previous DAM being a complete closure. However, modified gear is now being allowed under this proposed DAM rule, and we now conclude that the majority of the vessels can absorb the cost of converting to low entanglement risk gear, continue to fish and earn profits. The cost of converting the gear is less than total forgone revenues for these vessels. That is the reason the updated cumulative industry effects with the proposed DAM are lower, compared to the cumulative effects of the latest SAM rule.

Finally, the lower and upper bound annual cumulative effects for the lobster fleet under the proposed DAM action are \$1,349K and \$5,132K, respectively (Table 6.0.2). The lower and upper bound annual cumulative effects for the sink gillnet fleet are \$271K and \$314K, respectively.

## 7.0 FINDING OF NO SIGNIFICANT IMPACT

Impacts to society, both beneficial and adverse, were evaluated in this document and were determined to not be significant. The identification of gear modifications that could be implemented within a DAM, as described in this document, are expected to have short-term, site-specific negative impacts on the fishing industry. DAM gear modifications are also expected to have positive effects on right whales by reducing the risk of entanglement.

Public health and safety is not expected to be significantly affected by implementation of DAM gear modifications. Requiring fishermen to modify lobster trap and anchored gillnet fishing gear in DAM zones could result in fishermen being dislocated to unrestricted areas in order to resume fishing. Access to these unrestricted areas may require traveling further from home ports, which may expose fishermen to greater risk. Alternatively, fishing effort may become relocated closer to shore, which may present less risk. There is no evidence, however, that gear modifications within the DAM areas will result in significant impacts to public health and/or safety.

The exact location of a DAM zone cannot be predicted in advance because the area is created in response to the unexpected observation of a concentration of right whales that meets the DAM trigger. These areas are candidates for restrictions due to the presence of right whales. While these areas are valuable in spatial and temporal characteristics - offering benefits for right whale protection and recovery - these geographic areas do not have unique characteristics. There is no evidence that DAM zones would have unique geographic characteristics.

The effects on the human environment from DAM gear modifications are not likely to be highly controversial. The impact of gear modifications within an individual DAM zone may be controversial to the fishing community, but the overall effects on the human environment are not expected to be highly controversial. These DAM events are limited in geographic area and in time which automatically restricts the scope of the effects on the human environment.

It is impossible to identify the exact individuals likely to be affected by this proposed rule because the time and area of DAM zones cannot be predicted in advance. The analysis in this EA relies on previous sighting data to predict the number and location of DAM zones. This analysis provides sufficient information and insight into the potential effects associated with the implementation of DAM in future years. While the exact location and frequency of future DAM zones cannot be predicted, sufficient information exists which indicates that the effects cannot be characterized as highly uncertain. The implementation of fishery restrictions based on the

delineation of a DAM zone is not expected to result in any unique or unknown risks. Restrictions on fishing areas or gear types are not unusual and are already implemented in order to meet objectives of the Magnuson-Stevens Act, MMPA and ESA.

There is no evidence that implementation of DAM gear modifications as a management tool to reduce the risk of entanglement to right whales establishes a precedent for future actions with significant effects or represents a decision in principle about a future consideration. The justification for DAM can be found in the BOs drafted for the multispecies, monkfish, spiny dogfish and lobster fisheries. The use of DAM as a management tool has been determined to be important in order for the agency to meet mandated objectives under the MMPA and ESA. It is an independent action being implemented to achieve a specific objective and is therefore not expected to establish a precedent for future actions.

Section 6.0 of the EA examines the cumulative effects of this rule. Based on the information presented, it does not appear that this action will result in cumulatively significant impacts.

There is no evidence that the implementation of DAM gear modifications will adversely affect entities listed in or eligible for listing in the National Register of Historic Places or will cause loss or destruction of significant scientific, cultural, or historic resources. In addition, the result of DAM gear modifications will be temporary site specific restrictions on fishing practices. Compliance with these restrictions is, therefore, not likely to result in the permanent loss or destruction of resources.

NMFS has determined that low entanglement risk gear identified in this rule will sufficiently reduce the risk of entanglement to right whales. In order to avoid jeopardy, the Reasonable and Prudent Alternative (RPA) for the BOs require NMFS to implement management measures that will reduce the risk of serious injury and mortaltiy to right whales. Moreover, the RPA specified that NMFS must be able to respond to observations of concentrations of right whales in areas with fishing gear by requiring prompt removal or modification of that gear to reduce the risk of entanglement to right whales, and, thereby, avoid jeopardy. Therefore, the measures identified for inclusion under the DAM programs are not likely to adversely affect or jeopardize the continued existence of right whales. In addition, it is expected that other protected marine mammals, to the extent their distribution and abundance coincides with concentrations of right whales, will benefit from the imposition of DAM gear modifications. There is no evidence that threatened or endangered species will be adversely affected by DAM gear modifications. Similarly, there is no evidence that implementation of DAM gear modifications is likely to result in a violation of a Federal, state or local law for

environmental protection. In fact, DAM gear modifications would be expected to support Federal, state and local laws for environmental protection because it is expected that their goals and objectives would be similar to those of the MMPA and ESA. The implementation of DAM gear modifications would not result in any actions that would be expected to result in the introduction or spread of a nonindigenous species.

In view of the analysis presented in this document, it is hereby determined that the implementation of DAM gear modifications, as described in section 3.3 of this document, will not significantly affect the quality of the human environment with specific reference to the criteria contained in NAO 216-6 implementing the National Environmental Policy Act. Accordingly, the preparation of an Environmental Impact Statement for this rule is unnecessary.

Rebucca Lent

William T. Hogarth, Ph.D. Assistant Administrator for Fisheries

Rebecca Lent Deputy Assistant Administrator for Regulatory Programs National Marine Fisheries Service

## 8.0 REGULATORY IMPACT REVIEW (RIR)

A Regulatory Impact Review (RIR) for all regulatory actions that are of public interest is required by NMFS. The RIR does three things: 1) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; 2) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; and 3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed regulations are a "significant regulatory action" under certain criteria provided in Executive Order 12866. The purpose of the Regulatory Flexibility Act (RFA) (5 U.S.C. 601 et seq.) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. With the exception discussed below, the RFA requires agencies to conduct an Initial Regulatory Flexibility Analysis (IRFA) and Final Regulatory Flexibility Analysis (FRFA) for each proposed and final rule, respectively. The IRFA and FRFA are designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. Under the RFA, an agency does not need to conduct an IRFA or FRFA if a certification can be made that the proposed rule, if adopted, will not have a significant economic impact on a substantial number of small entities. The general intent of the RIR and RFA analytical and process requirements is to make the decision process open and transparent so that all can understand the what, where, and why of regulatory decision-making and can agree that the required steps of the process were followed. The economic analyses provide decision-makers and the public with the agency's best estimates of the impacts of proposed and final actions and of their alternatives.

# 8.1 Executive Order (E.O.) 12866

The RIR is intended to assist NMFS decision making by selecting the regulatory action that maximizes net benefits to the Nation.

### Right Whale Management

The preferred alternative is a modification of a previous Dynamic Area Management (DAM) rule (67 FR 1133, January 9, 2002). The current DAM program contains mandatory and voluntary options that may require or request vessels to remove all lobster trap and anchored gillnet gear from a DAM zone. Under this rule, vessels will be allowed to fish in

a DAM zone if they convert to gear determined by NMFS to sufficiently reduce the risk of entanglement to right whales.

The gear regulations, including area restrictions and complete closures, have been developed over several years in support of the ALWTRP. In the final DAM EA/RIR (NMFS, 2001), six potential DAM closures were identified based on 2000 right whale sightings data. The economic impact of closing these six areas was assessed. These same 2000 right whale sightings data were used to design the spatial and temporal boundaries of SAM. SAM encompasses four of the six DAM areas. One DAM area is in Canadian waters - outside U.S. jurisdiction. Therefore, economic impacts are assessed for one DAM area under the proposed modified DAM action. In the final DAM EA/RIR, the DAM zone that served as a basis for that analysis and will serve as the basis for the analysis presented here would have affected 45 vessels (29 lobster trap and 16 sink gillnet vessels) over a period from June 20th to July 6th.

In addition to right whale management measures implemented under the ALWTRP, anchored gillnet vessels are regulated under dogfish, monkfish and groundfish plans. Vessels may have additional fishing restriction under these plans. As a result, right whale management may in fact not incur any extra cost since these vessels may be restricted from fishing in SAM and/or DAM areas under these other plans.

## Framework for Analysis

Net National benefits are measured through economic surpluses, consumer, and producer surplus. Within this setting, consumer surplus is associated with the value of right whales and the consumer surplus associated with seafood products supplied by the lobster trap and anchored gillnet fisheries. The value of right whale protection is comprised of non-consumptive use and non-use values. Non-consumptive use value is associated with activities such as whale watching while non-use value is associated with the satisfaction that people derive from knowing that right whales exist. Producer surplus is associated with the economic profit earned by businesses engaged in the lobster trap and anchored gillnet fisheries as well as that earned by businesses providing transportation services to individuals that want to view right whales.

The preferred alternative is expected to provide relief from the current regulatory burden. Under the status quo, a complete closure may be implemented when a DAM is triggered. Vessels may incur revenue losses, costs associated with gear removal and resetting outside of a DAM zone, plus they incur the risk of losing fishing grounds to other vessels. By allowing vessels to continue fishing in DAM zones with modified gear as identified under the preferred alternative, regulatory relief is expected.

When comparing a regulatory action to the status quo or "no action" alternative, it is the change in net National benefit that becomes the focal point of analysis. Vessels that convert their gear to avoid a DAM closure may increase right whale protection when DAMs are not triggered and right whales are present. Allowing modified gear in a DAM zone minimizes entanglement risk to right whales while allowing fishermen to continue fishing in the area. If vessels are allowed to fish in a DAM zone with modified gear, we also expect some positive change in consumer surpluses associated with the lobster and seafood industry. Furthermore, this rule should result in an increase in producer surpluses for the fishing industry since they can continue fishing in the DAM zone. Therefore, net National benefits should increase under this rule since we expect an increase in consumer and producer surpluses associated with the lobster and gillnet fisheries.

As long as vessels will be able to fish inside the DAM zone (provided they use conforming gear) any change in the market supplies of lobster or seafood products would be unaffected. Therefore, any positive impact on seafood consumer surplus would be the same under any of three gear alternatives. This means that any difference in net National benefit will be associated with differences in the cost of gear modifications under the PA or NPA's. Then the ensuing analyses focuses primarily on identifying the most cost effective regulatory alternative.

8.2 Regulatory cost to Lobster and Sink Gillnet Fleets for DAM Under the three alternatives, excluding status quo, vessels must convert their gear to fish in the DAM zone. This final rule is an incentive based program. If vessels convert to low entanglement risk gear, as specified under the PA, and a DAM is triggered within their fishing area, they will not have to remove their gear. For analytical purposes, we can assess the cost of converting the gear that is being fished within the DAM area only. However, vessels that fish in a DAM zone are likely to have gear fishing elsewhere. As an alternative analytical approach, a vessel could choose to convert all their gear to low entanglement risk gear since it is all subject to future and potential DAM zones. In this EA we analyze the second approach. That is, a vessel fishing in the DAM zone will choose to convert all their gear.

Under the PA, low entanglement risk lobster gear incorporates the following: 1) the use of neutrally buoyant or sinking line on all ground lines; 2) the allowance for 2 buoy lines comprised of sinking or neutrally buoyant line except for the bottom one-third, which may be made of floating line; 3) a weak link (WL) with a breaking strength of 1,500 pounds on the high flyer and the buoy ball in Offshore lobster waters, and 600 pounds in Northern Nearshore and Inshore

lobster waters; and 4) a weak link with a breaking strength of 3,780 pounds just below the water surface.<sup>25</sup>

Under the PA, low entanglement risk sink gillnet gear incorporates the following: 1) the use of neutrally buoyant or sinking line on all ground and anchor lines; 2) the allowance for 2 buoy lines comprised of sinking or neutrally buoyant line except for the bottom one-third, which may be made of floating line; 3) a weak link (WL) with a breaking strength of 1,100 pounds on the high flyer and the buoy ball; 4) 5 weak links of 1,100 lb breaking strength on each net panel; 5) a weak link with a breaking strength of 3,780 pounds just below the water surface (see footnote 25); and 6) a anchor with holding power of at least a 22 pound Danforth-style anchor or greater at the end of each sink gillnet string.

The difference between the alternatives is the number of buoy lines allowed per set of gear and the material composition of the buoy line. The following differences in alternatives are evaluated: 1) under the NPA 1 plan, only 1 buoy line made of 100 percent neutrally buoyant or sinking line is allowed; 2) status quo; 3) under the PA plan, 2 buoy lines are allowed per set of gear, and the buoy line can consist of 2/3 neutrally buoyant or sinking line and 1/3 poly rope and; 4) under the NPA 2 plan, 2 buoy lines are allowed per set of gear, however, the buoy line must be made of 100 percent neutrally buoyant or sinking line.

Several potential scenarios exist as to how the fishing industry may adapt to this action. The scenarios include: 1) convert to low entanglement risk gear and continue fishing in DAM; 2) choose not to fish or convert to low entanglement risk gear; or 3) fish outside of the DAM area, do not convert to low entanglement risk gear, and move gear back into DAM when it reopens.

In this section we discuss the economic impacts on the industry in section 8.2.1. The cumulative effects of this proposed regulations with proceeding regulations are discussed in section 6.0.

During the SAM rulemaking, NMFS proposed requiring the installation of weak links with a maximum breaking strength of 3,780 lb in the offshore lobster trap and anchored gillnet gear between the surface system (all surface buoys, the high flyer, and associated lines) and the buoy line leading down to the trawl and gillnet, respectively. However, NMFS has reconsidered this measure after receiving comments and is not requiring the use of 3,780 lb weak links between the surface system and the buoy line for the offshore lobster trap and anchored gillnet gear within the SAM areas.

## 8.2.1 Industry Impacts

In the final DAM EA/RIR, the DAM zone that served as a basis for that analysis and will serve as the basis for the analysis presented here would have affected 45 vessels (29 lobster trap and 16 sink gillnet vessels) over a period from June  $20^{\rm th}$  to July  $6^{\rm th}$  (Table 8.2.1).

The lower bound industry costs for the NPA 1, PA, and NPA 2 are \$47.1K, \$55.4K, and \$58.7K, respectively. These costs are based on a one year loan payment to convert gear. The upper bound industry costs for the NPA 1, PA, and NPA 2 plan are \$113.3K, \$129.3K, and \$134.7K, respectively. Under status quo, total forgone industry revenues for the lobster and sink gillnet fleet under the worst case scenario are estimated at \$529.5K. See Section 5.1.2, 5.2.2, 5.3.2 and 5.4.2 for details

Table 8.2.1

Summary of the lower and upper bound industry cost of converting gear under the NPA 1, PA, and NPA 2 plan by fleet, based on annual loan payments.

	Number	NP <i>I</i>	A 1	P.	A	NPA 2		
Fleet	of Vessels	LB (\$K)	UB (\$K)	LB (\$K)	UB (\$K)	LB (\$K)	UB (\$K)	
Lobster	29	27.4	82.2	31.1	93.7	32.1	96.8	
Sink Gillnet	16	19.7	31.1	24.3	35.6	26.6	37.9	
Total	45	47.1	113.3	55.4	129.3	58.7	134.7	

#### Lobster Fleet

The lobster fleet's lower bound industry costs for the NPA 1, PA, and NPA 2 are \$27.4 K, \$31.1 K, and \$32.1 K, respectively. Similarly, the upper bound industry costs for the NPA 1, PA, and NPA 2 plan are \$82.2 K, \$93.7 K, and \$96.8 K, respectively (Table 8.2.1). Under status quo and the worst case scenario, forgone revenues for the lobster fleet are \$154.8 K.

#### Sink Gillnet Fleet

The total lower bound industry costs for the sink gillnet fleet under the NPA 1, PA, and NPA 2 plan are \$19.7K, \$24.4K and \$26.6K, respectively (Table 8.2.1). The total upper bound industry costs under the NPA 1, PA, and NPA 2 plan are \$31.1K, \$35.6K, and \$37.9K,

respectively. Under status quo and the worst case scenario, forgone revenues for the sink gillnet fleet are \$374.7K.

## 8.3 Final Regulatory Flexibility Act Analysis

The regulatory flexibility analysis is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. In addition to analyses conducted for the Regulatory Impact Review (RIR), the final regulatory flexibility analysis provides: 1) a succinct statement of the need for, and objectives of the rule; 2) a summary of the significant issues raised by the public comments in response to the Initial Regulatory Flexibility Analysis (IRFA); 3) a description and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available; 4) a description of the projected reporting, recordkeeping, and other compliance requirements of the rule, including an estimate of the classes of small entities which will be subject to the requirements and the type of professional skills necessary for the preparation of the report or record; and 5) a description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and the reason that each one of the other significant alternatives to the rule considered by the agency which may affect small entities was rejected.

<u>Statement of the need for, and objectives of the rule:</u> The need and purpose of the action are set forth in Section 2.0 of this document and are included herein by reference.

Summary of the significant issues raised by the public comments in response to the Initial Regulatory Flexibility Analysis (IRFA): Several commenters expressed opposition to the proposal to require the use of a single end line and prohibition on the use of floating line on the buoy line. Moreover, commenters suggested that NMFS consider the current management measures in the Cape Cod Bay Critical Habitat Area for quidance with respect to regulating buoy lines. These regulations allow lobstermen to fish with two buoy lines on a trawl and allows for a section of floating line on the buoy line. With respect to gillnet gear, one commenter suggests allowing the use of two end lines on gillnets with Danforth-style anchors at each end to ensure the proper operation of weak links on the gear. In addition, this commenter and others felt that NMFS failed to analyze the increased potential for gear conflicts and financial loss to fixed gear fishermen from prohibiting the use of two end lines. One commenter suggested that NMFS consider allowing fishermen to replace the second endline with a very weak buoy line for the purpose of marking the location of the gear during the 15-day DAM restricted period. Several commenters felt that this proposed provision would lead to a lot of lobster gear loss because it is very common for

lobstermen to lose one buoy line. Finally this commenter and others felt that prohibiting the use of two buoy lines may encourage lobstermen to split their trawls into smaller units, which could result in additional vertical lines in the water.

<u>Description and estimate of the number of small entities to which the rule will apply:</u> In the northeast there are potentially 7,147 vessels fishing lobster gear and 312 vessels fishing sink gillnet gear (Bisack, 2000). The final rule, based on a retrospective analysis using 2000 right whale sightings data and 2000 Vessel Trip Report data, would affect 45 lobster and sink gillnet vessels over a period from June  $20^{th}$  to July  $6^{th}$ . These vessels represent 0.4 percent (0.004=29/7,147 lobster vessels) of the lobster fleet and 5.1 percent (0.051=16/312 sink gillnet vessels) of the sink gillnet fleet in the northeast.

Under the final rule, if a vessel converts its gear, Class I (length less than 35 feet) and Class II (length between 35 and 50 feet) vessels fishing lobster gear will have profits reduced by a minimum of 3 percent (maximum of 10 percent) and 1 percent (maximum of 3 percent), respectively (Table 8.3.1). A Class I (length less than 40 feet) and Class II (greater than 40 feet) vessel fishing sink gillnet gear will have profits reduced by a minimum of 0.4 percent (maximum of 0.7 percent) and 1.5 percent (maximum of 2.2 percent), respectively.

Table 8.3.1

Summary profit reductions based on annual loan payments for gear conversion costs under the non-preferred alternative 1 (NPA 1), preferred alternative (PA), and non-preferred alternative 2 (NPA 2) plan by vessel length class and fleet, with annual loan payments in parentheses.

						3			
				NP	A 1	P2	A	NPA 2	
	Length Class	Length	Number of Vessels	LB	UB	LB	UB	LB	ÜΒ
Tobatom									
Lobster	Class	L<36							
	I		13	0.030	0.090	0.034	0.103	0.035	0.107
				(\$944)	(\$2,833)	(\$1 <b>,</b> 072)	(\$3,230)	(\$1 <b>,</b> 107)	(\$3 <b>,</b> 337)
	Class	35 <l<50< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></l<50<>							
	II		16	0.008	0.024	0.009	0.027	0.009	0.028
				(\$944)	(\$2 <b>,</b> 833)	(\$1,072)	(\$3 <b>,</b> 230)	(\$1,107)	(\$3 <b>,</b> 337)
Sink Gillnet	Class	L<40							
	I		4	0.004	0.007	0.004	0.007	0.005	0.007
				(\$295)	(\$514)	(\$321)	(\$540)	(\$330)	(\$549)
	Class	L>39							
	II		12	0.012	0.019	0.015	0.022	0.016	0.023
				(\$1 <b>,</b> 547)	(\$2,420)	(\$1 <b>,</b> 918)	(\$2 <b>,</b> 790)	(\$2 <b>,</b> 106)	(\$2 <b>,</b> 979)

Under status quo, if a lobster vessel chose not to fish outside the DAM zone, annual revenues would be reduced by 5 percent if these vessels chose not to fish from June  $20^{\rm th}$  to July  $6^{\rm th}$ . It is important to note that this represents forgone revenues for one DAM zone, and a vessel could be subject to multiple DAM zones or closures that are extended in time and space. Annual forgone revenues would be reduced by approximately 9 percent for a sink gillnet vessel if they also chose not to fish outside the DAM zone from June  $20^{\rm th}$  to July  $6^{\rm th}$ .

Under the NPA 1 plan, if a vessel converts its gear, a Class I (length less than 35 feet) and Class II (length between 35 and 50) vessels fishing lobster gear will have profits reduced by a minimum of 3 percent (maximum of 9 percent) and 1 percent (maximum of 2 percent), respectively (Table 8.3.1). A Class I (length less than 40 feet) and Class II (greater than 40 feet) vessel fishing sink gillnet gear will have profits reduced by a minimum of 0.4 percent (maximum of 0.7

percent) and 1.2 percent (maximum of 1.9 percent), respectively.

Under the NPA 2 plan, if a vessel converts its gear, Class I (length less than 35 feet) and Class II (length between 35 and 50 feet) vessels fishing lobster gear will have profits reduced by a minimum of 3.5 percent (maximum of 10.7 percent) and 1 percent (maximum of 3 percent), respectively (Table 8.3.1). A Class I (length less than 40 feet) and Class II (greater than 40 feet) vessel fishing sink gillnet gear will have profits reduced by a minimum of 0.5 percent (maximum of 0.7 percent) and 1.6 percent (maximum of 2.3 percent), respectively.

Description of the projected reporting, record-keeping, and other compliance requirements of the rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records: The final rule would not impose any additional reporting, record-keeping, or compliance requirements. Thus, no new skills would be required for compliance.

Description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and the reason that each one of the other significant alternatives to the rule considered by the agency which may affect small entities was rejected:

NMFS has taken steps to minimize the economic impacts on small entities through this final rule by establishing the option of utilizing gear modifications rather than completely closing DAM zones. The measures identified in this final rule satisfy the stated objectives for allowing gear modifications within a DAM zone under the DAM program by sufficiently reducing the risk of entanglement to right whales. In addition, the gear modifications identified in this rule are consistent with the objectives of the applicable statues - namely, the ESA and the MMPA.

Under section 2 of the ESA, one of the stated purposes of the statute is to provide a program for the conservation of endangered species and to declare that all Federal agencies use their authority to meet this objective. With this objective in mind, section 7 of the ESA requires each Federal agency to consult with NMFS to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species. Pursuant to section 7 of the ESA, a biological opinion (BO) on the three Fishery Management Plans (FMP) for the monkfish, spiny dogfish, and multispecies fisheries, and the Federal regulations for the lobster fishery was issued on June 14, 2001. The BO concluded that the FMPs and lobster regulations jeopardized the continued existence of right whales. Accordingly, NMFS defined a Reasonable and Prudent

Alternative (RPA) with multiple management components to the proposed action. Among the RPA elements was a mechanism for the expedited implementation of restrictions in areas outside designated right whale critical habitat, which NMFS has termed Dynamic Area Management (DAM). The preferred alternative is intended to identify gear modifications that may be required as one management option for protecting right whales inside a DAM zone and is within the scope of the RPA for the DAM program. Therefore, the gear modifications identified in this rule are consistent with the stated objective of the ESA.

The purpose of the MMPA, as stated in section 2, is to prevent species of marine mammals from diminishing to the point where they cease to be a significant functioning element in the ecosystem of which they are a part. In addition, for species that are already diminished below their optimum sustainable population, such as right whales, further measures should be immediately taken to replenish those species or stocks. The serious injury and mortality of right whales caused by interactions with fixed fishing gear is a serious impediment to the recovery of the species. This rule identifies gear modifications that sufficiently reduce the risk of entanglement to right whales under the DAM program. Under the authority of section 118 of the MMPA, the objective of this rule, to reduce the level of serious injury and mortality of right whales in East Coast lobster trap and finfish gillnet fisheries, is consistent with the stated purpose of the MMPA.

NMFS considered a "no action" or status quo alternative that would result in no changes to the current measures under the ALWTRP. The no action alternative would result in NMFS only having the options of requiring the removal of all lobster trap and anchored gillnet gear from a DAM zone or issuing an alert requesting the voluntary removal of all gear. NMFS rejected this alternative as NMFS would not be able to exercise the full range of management options that the agency intended to be available under the DAM program.

NMFS considered an alternative (NPA 1) that would allow SAM gear modifications to be used under the DAM program. SAM gear modifications include, amongst other requirements, the use of neutrally buoyant or sinking line on all ground lines and buoy lines and restricts fishermen to one endline (buoy line) per trawl or string. Based on comments received, NMFS understands that requiring gear modifications with one buoy line in a DAM area may result in fishermen fishing shorter trawls which may result in the same or a greater number of buoy lines. Additionally, information received through the comment period, supports video footage taken by NMFS and discussed in the EA/RIR that allowing one third polypropylene line on the bottom third of the buoy line does not necessarily produce a loop in the water column and increase risk to right whales due to current and tidal action on the surface system.

The Preferred Alternative would implement SAM gear modifications with two endlines (buoy lines) and floating line on the bottom third of each endline. These are similar gear modifications required under the ALWTRP in Cape Cod Bay Critical Habitat during the high use time period for right whales (January 1 - May 15). NMFS believes that this gear, which is currently required in a critical habitat area during the time period when whales occur in the area, sufficiently reduces the risk of entanglement to right whales.

NMFS considered an alternative (NPA 2) that would implement SAM gear modifications with two endlines (buoy lines). Thus, this alternative would allow lobster trap and anchored gillnet fishermen to retain a second end line on each end of the lobster trap or gillnet trawl and require that the buoy lines be composed of sinking or neutrally buoyant line. NMFS rejected this alternative as information received during the comment period supports preliminary information recorded by NMFS that allowing some floating line on the buoy line does not necessarily produce a loop in the water column and increase risk to right whales due to current and tidal action on the surface system.

The retrospective analysis of right whale sightings from 2000 indicated that this rule would affect 45 lobster and sink gillnet vessels, which represent 0.4 percent (=29/7,147) of the lobster fleet and 5.1 percent (=16/312) of the sink gillnet fleet in the northeast. Under the preferred alternative, a Class I and Class II vessel fishing lobster gear will have profits reduced by a minimum of 3 percent (maximum of 10 percent) and 1 percent (maximum of 3 percent), respectively. A Class I and Class II vessel fishing sink gillnet gear will have profits reduced by a minimum of 0.4 percent (maximum of 0.7 percent) and 1.5 percent (maximum of 2.2 percent), respectively.

Under the preferred alternative, we expect that lobster and sink gillnet vessels will be able to convert to low entanglement risk gear, continue to fish, and earn profits.

Under status quo, if a lobster vessel chose not to fish outside the DAM zone, annual revenues would be reduced by 5 percent if these vessels chose not to fish from June  $20^{\rm th}$  to July  $6^{\rm th}$ . It is important to note that this represents forgone revenues for one DAM zone, and a vessel could be subject to multiple DAM zones or closures that are extended in time and space. Annual forgone revenues would be reduced by approximately 9 percent for a sink gillnet vessel if they also chose not to fish outside the DAM zone from June  $20^{\rm th}$  to July  $6^{\rm th}$ . In conclusion, the proposed action reduces the regulatory burden on the individual vessel by allowing them to continue fishing in a DAM zone with modified gear.

Therefore, lobster and sink gillnet vessels are likely to convert to low entanglement risk gear since the reduction in profits would be much lower than a complete closure of the DAM zone.

## 9.0 APPLICABLE LAW

# 9.1 National Environmental Policy Act

NMFS has prepared this document as an environmental assessment for this action with a finding of no significant impact.

# 9.2 Endangered Species Act

A BO on the three Fishery Management Plans (FMP) for the monkfish, spiny dogfish, and multispecies fisheries, and the Federal regulations for the lobster fishery was issued on June 14, 2001. The BO concluded that the FMPs and lobster regulations jeopardize the continued existence of right whales. Therefore, NMFS defined a Reasonable and Prudent Alternative (RPA) with multiple management components to the proposed action. Among the RPA elements was a mechanism for the expedited implementation of restrictions in areas outside designated right whale critical habitat, which NMFS has termed Dynamic Area Management (DAM). The preferred alternative is intended to identify gear modifications that may be required as one management option for protecting right whales inside a DAM zone and is within the scope of the RPA for the DAM program. Therefore, subsequent consultation is not necessary to meet the requirements of section 7(a)(2).

## 9.3 Marine Mammal Protection Act

The preferred alternative facilitates implementation of the ALWTRP and will have no adverse impact on marine mammals.

## 9.4 Paperwork Reduction Act

This action does not contain a collection-of-information requirement for the purposes of the Paperwork Reduction Act.

# 9.5 Essential Fish Habitat

The area affected by this action has been identified as EFH for species in the Northeast groundfish, sea scallops, monkfish, and spiny dogfish fisheries. The preferred alternative will have no adverse impact on EFH, therefore, an EFH consultation is not required. The basis for this determination is that the gear types involved, anchored gillnet and lobster trap gear, have minimal and short-term impacts on EFH.

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